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Validity and Importance of Low Ratings Given Medical Graduates in Noncognitive Areas—Mary W. Herman, J. Jon Veloski, and Mohammadreza Hojat 837
Evaluating Instruction in Medical Education—David M. Irby 844
Achievement Motivation in Medical Students—Lillian Robbins, Edwin S. Robbins, Steven E. Katz, Barbara Geliebter, and Marvin Stern 850
Evaluating Alcoholism and Drug Abuse Knowledge in Medical Education: A Collaborative Project—John B. Griffin, Jr., I. Kathryn Hill, Johanna J. Jones, Kim A. Keeley, Ronald S. Krug, and Alex Pokorny 859
Improvement of Reliability of an Oral Examination by a Structured Evaluation Instrument—June C. Yang and Douglas W. Laube 864
Characteristics of Clinical Information-Searching: Investigation Using Critical Incident Technique—Diana E. Northup, Margaret Moore-West, Betty Skipper, and Sallie R. Teaf 873
Characteristics of Highly Rated Family Practice Preceptors—Peter J. MacDonald and Martin J. Bass 882
Using Patient-Simulators To Teach Telephone Communication Skills to Health Professionals—Susan Evens and Peter Curtis 894
Communications: Trends in Teaching Systems Courses in American Medical Schools, 1975–1983—Charles G. Atkins 899
Development of a Community-Based Office of Research Consultation—Steven M. Downing, Robert K. Richards, Jack L. Maatsch, and John C. Peirce 902
Briefs 904
Editorial: Medicare's Prospective Payment System and the Teaching Hospitals 906
Datagram: The Relationship Between MCAT Science Scores and Undergraduate Science GPA 908
Book Review 912
Bibliography 915
Letter to the Editor 920

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COMMUNICATIONS

Trends in Teaching Systems Courses In American Medical Schools, 1975–1983

Charles G. Atkins, Ph.D.

The organization of courses around a given organ system began many years ago and has been adopted into the curricula of numerous medical schools in the United States and Canada. Although different phrases have evolved as synonyms (for example, systems biology and committee course), the systems courses have several common characteristics that set them apart from the traditional basic science courses that are organized around a particular specialty or department. Among these characteristics, in addition to the organ systems emphasis, are the multidisciplinary nature of the courses, the larger number of credit and contact hours, and the goal of interrelating the many concepts of the system toward a better understanding of the system as a whole.

In some medical schools, introductory courses in the traditional discipline precede the systems courses; in other medical schools, the incoming student begins with these integrated classes. In the present study, the former type of curriculum is labeled combined curriculum, while the latter type is referred to as systems curriculum. Curriculum organized around specialty areas is designated as traditional curriculum. Integrated traditional curriculum refers to a curriculum which presents traditional basic science and clinical material in an integrated manner that de-emphasizes traditional specialties (the focal problems method, for example).

The basic goal of the study is to measure the utilization of the organ systems curriculum in the medical schools of the United States and Canada over the past eight years.

Method

The data for the study were obtained from the annual editions of the *Curriculum Directory* published by the Association of American Medical Colleges (AAMC) for the years 1975–76 through 1982–83. Each medical school was classified by the present author as to whether its curriculum was traditional; systems; combined systems and traditional; traditional, but with one, two, or three systems courses; integrated traditional; or not categorized (because of insufficient information). Most often, the reason for placing a school in the fourth group was that traditional courses made up the bulk of its curriculum, but there were several (one to three) courses which were organized around an organ system. Courses with names such as neurosciences, reproduction, and endocrinology were not interpreted as being systems courses unless the presence of other systems courses indicated that they were part of a systems or combined curriculum. Likewise, on occasion, a pathophysiology course was subdivided into organ systems. However, since these courses were not multidisciplinary and did not fit the above description of systems courses, these were not classified as such.

Results and Discussion

The AAMC data obtained from annual surveys of U.S. medical schools are shown in Table 1. Since the number of medical schools increased between 1975 and 1983, the percent of schools utilizing a curriculum type gives a better indication than does the number of schools. These figures show a steady decline in the percent of schools using a systems or combined curriculum from the 1976–77 academic year to 1981–82. Use of systems courses, either combined with traditional

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TABLE 1

Number and Percentage of Five Types of Curriculum in U.S. Medical Schools, 1975 to 1983

Curriculum Category	1975–76		1976–77		1977–78		1978–79		1979–80		1980–81		1981–82		1982–83	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Traditional	76	63.9	73	60.8	81	65.8	91	70.0	94	71.7	97	74.0	100	75.8	100	77.0
Systems	10	8.4	11	9.2	5	4.1	6	4.6	6	4.6	5	3.8	5	3.8	5	3.8
Combined	23	19.3	25	20.8	29	23.6	25	19.2	24	18.3	22	16.8	19	14.4	19	14.6
Traditional with 1 to 3 systems courses	2	1.7	2	1.7	2	1.6	1	0.8	1	0.8	2	1.5	2	1.5	2	1.5
Integrated traditional	6	5.0	8	6.7	5	4.1	6	4.6	5	3.8	4	3.1	5	3.8	3	2.3
Not categorized	2	1.7	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8
Subtotal	119	100	120	100	123	100	130	100	131	100	131	100	132	100	130	100
All traditional*	84	71.8	83	69.7	88	72.1	98	76.0	100	76.9	103	79.2	107	81.7	105	81.4
Systems and combined courses	33	28.2	36	30.3	34	27.9	31	24.0	30	23.1	27	20.8	24	18.3	24	18.6
Subtotal	117	100	119	100	122	100	129	100	130	100	130	100	131	100	129	100

* Traditional, traditional with 1 to 3 systems courses, and integrated traditional curriculum categories.

courses or not, peaked in 1976–77 at 30.3 percent. The slight percent increase in 1982–83 is a reflection of fewer schools in the survey and not of an increase in the popularity of the systems approach. Although the differences from year to year are not statistically significant (even between 1977–78 and 1978–79 academic years when there was a 3.9 percent decrease), the difference from the beginning to the end of the study was found to be significant (chi-square = 6.11, $p < .05$).

A similar analysis was made of the Canadian medical schools listed in the *Curriculum Directory* over the same eight-year period. Unlike the medical schools of the United States, the number of Canadian schools held constant at 16 during this eight-year period. For all but two of the eight years, their utilization of systems curricula remained the same. Seven (43.8 percent) of the Canadian schools utilized a traditional curriculum, and nine (56.2 percent) utilized a systems or combined systems approach in their curricula.

Utilizing 14 medical schools in the United States where the hours in each organ systems course could be clearly demarcated, the author ascertained the eight most commonly occurring systems courses. They are as follows, with the number after each being the average number of hours taught over the three-year period from 1980 to 1983: neural, 127.3 hours; cardiovascular, 91.8 hours; gastrointestinal, 83.9 hours; respiratory, 76.8 hours; musculoskeletal, 73.1 hours; reproduction, 67.2 hours; endocrinology, 64.6 hours; and renal-urinary, 62.1 hours.

Conclusions

The use of systems or combined systems curriculum in the medical schools of the United States has decreased significantly over the last eight years to the point that it is currently in use in less than one-fifth of the country's medical schools. By contrast, over half of the Canadian medical schools use a systems curriculum, and there has been no decrease in its use over the same eight-year period from 1975 to 1983.

DATAGRAM

The Relationship Between MCAT Science Scores And Undergraduate Science GPA

A major limiting factor in the use of undergraduate college grades as an unbiased indicator of academic achievement for medical school admissions decisions is the variability in the meaning of grades achieved at diverse undergraduate institutions. Even after the conversion of various grading systems by the American Medical College Application Service to a four-point scale, the commonality of the grade-point averages (GPAs) examined by admissions committee members is only on paper. Identical numbers may reflect differing levels of achievement. Medical schools recognize this problem and tend to deal with it in two ways: (*a*) by a formal weighting of GPA based on some measure of the quality or selectivity of the undergraduate institution, or (*b*) by an informal weighting based on the school's experience with graduates of that institution, which contributes to the overall impression of the candidate. In both cases, Medical College Admission Test (MCAT) scores are used for confirmation of the student's level of achievement.

The purpose of the authors in this datagram is to document the variability in the meaning of grades by using the MCAT scores as a criterion. In so doing, the authors explore the correspondence between MCAT scores and undergraduate GPA of medical school applicants and the role that selectivity in admissions of the undergraduate college plays in moderating this relationship. Undergraduate science GPA and scores on the four MCAT science areas of assessment were the particular focuses of the study.

The data are based on all applicants to the 1981-82 entering class for whom complete information was available (n = 32,271). The applicants were distributed into four groups corresponding with the selectivity of their undergraduate college. The college selectivity measure used is one commonly known as the Astin index (1), which provides the average combined Scholastic Aptitude Test score of entering freshman students at each college or university. Index data for 1977 were used for the study. Each of the 32,271 1981-82 medical school applicants was assigned the selectivity score of the college or university he had attended. The resulting distribution had a mean of 1037 and a standard deviation of 144, with a range of 550 to 1420. Selectivity groups were defined by various points on this distribution as follows:

Low selectivity—892 or less (greater than −1 standard deviations below the mean).

Medium selectivity—893 to 1036 (0 to −1 standard deviations).

High selectivity—1037 to 1181 (0 to +1 standard deviations).

Very high selectivity—1182 or more (greater than +1 standard deviations above the mean).

Table 1 provides means and standard deviations for each MCAT science score separately by selectivity of undergraduate college and science GPA. Figure 1 illustrates the relationship of the selectivity, the science GPA, and the average of the four MCAT science areas of assessment. Two observations can be made from Figure 1 that apply similarly to the data in the table. The first is that there is a positive and fairly linear trend in the relationship between the MCAT science average and the science GPA, at least for GPAs between 2.51 and 3.80, at all four types of colleges. This is summarized by Pearson correlation coefficients of approximately .5, shown in Table 1. A sharper downturn in MCAT performance is shown for those with GPAs below 2.51. However, this is likely the result of aggregating all applicants with GPAs below 2.51. A sharper upturn in MCAT performance is shown for those with GPAs above 3.8, particularly at high, medium and low selectivity colleges. This may be explained by a "ceiling effect" for the GPA for students at those schools, which does not occur with the MCAT.

The second observation is that, despite sim-

TABLE 1

Means, Standard Deviations, and Correlations of MCAT Science Scores by Undergraduate Science GPA and Selectivity of Undergraduate College (SUC) of 32,271 Applicants to U.S. Medical Schools in 1981–82*

	Science GPA								
MCAT Subtest/SUC	0–2.50	2.51–2.80	2.81–3.00	3.01–3.20	3.21–3.40	3.40–3.61	3.61–3.80	3.81–4.00	MCAT/ Science GPA Correlation
Biology									
Very High									
Mean	7.70	8.56	9.28	9.50	9.82	10.10	10.31	10.82	.42
S.D.	2.29	2.13	1.83	1.72	1.65	1.66	1.59	1.63	
High									
Mean	7.08	8.26	8.69	8.94	9.34	9.61	9.92	10.34	.41
S.D.	2.37	2.25	2.07	2.06	1.93	1.86	1.82	1.79	
Medium									
Mean	6.69	7.48	8.01	8.28	8.56	8.86	9.16	9.62	.38
S.D.	2.37	2.26	2.14	2.13	2.05	1.93	1.93	1.98	
Low									
Mean	5.56	6.70	6.78	7.53	7.72	8.06	8.31	8.87	.41
S.D.	2.32	2.39	2.40	2.26	2.32	2.17	2.07	2.10	
Chemistry									
Very High									
Mean	7.47	8.48	9.18	9.46	9.96	10.40	10.96	11.70	.54
S.D.	2.00	1.87	1.77	1.74	1.73	1.72	1.67	1.71	
High									
Mean	6.75	7.87	8.27	8.80	9.24	9.66	10.10	11.01	.53
S.D.	1.94	2.03	1.91	1.97	1.86	1.91	1.85	1.79	
Medium									
Mean	6.26	6.94	7.57	7.84	8.28	8.65	9.14	10.03	.49
S.D.	1.84	2.03	1.91	1.97	1.86	1.91	1.85	1.79	
Low									
Mean	5.39	6.23	6.52	7.10	7.40	7.72	8.21	9.04	.48
S.D.	1.70	1.94	1.99	1.93	2.04	2.04	2.03	2.09	
Physics									
Very High									
Mean	7.36	8.37	9.19	9.52	9.95	10.51	10.98	11.66	.51
S.D.	2.06	2.16	1.94	1.91	1.83	1.95	1.87	1.95	
High									
Mean	6.70	7.87	8.27	8.81	9.25	9.67	10.14	10.89	.49
S.D.	2.16	2.20	2.03	2.06	2.04	2.03	1.98	2.06	
Medium									
Mean	6.40	6.99	7.60	7.85	8.27	8.59	8.99	9.86	.43
S.D.	1.99	1.98	1.99	2.07	2.04	2.04	2.06	2.19	
Low									
Mean	5.50	6.32	6.58	7.14	7.41	7.73	8.24	8.85	.44
S.D.	1.74	2.01	2.15	2.09	2.10	2.16	2.21	2.21	
Science Problems									
Very High									
Mean	7.42	8.46	9.16	9.42	9.88	10.31	10.71	11.53	.50
S.D.	2.04	2.03	1.86	1.77	1.72	1.83	1.76	1.88	
High									
Mean	6.79	7.89	8.34	8.71	9.16	9.56	10.01	10.78	.49
S.D.	2.12	2.10	1.94	2.00	1.94	1.95	1.92	2.02	
Medium									
Mean	6.36	7.03	7.64	7.83	8.25	8.59	8.96	9.77	.44
S.D.	1.96	1.96	1.92	1.99	1.95	1.89	1.96	2.12	
Low									
Mean	5.40	6.32	6.45	7.13	7.32	7.66	8.10	8.84	.45
S.D.	1.79	2.03	2.01	1.99	2.04	2.02	2.06	2.12	

* Data are based on all applicants to the 1981–82 entering class for whom complete information is available: very high = 5,826; high = 9,754; medium = 11,852; low = 4,839. See text for derivation of groups and explanation of selectivity of undergraduate college.

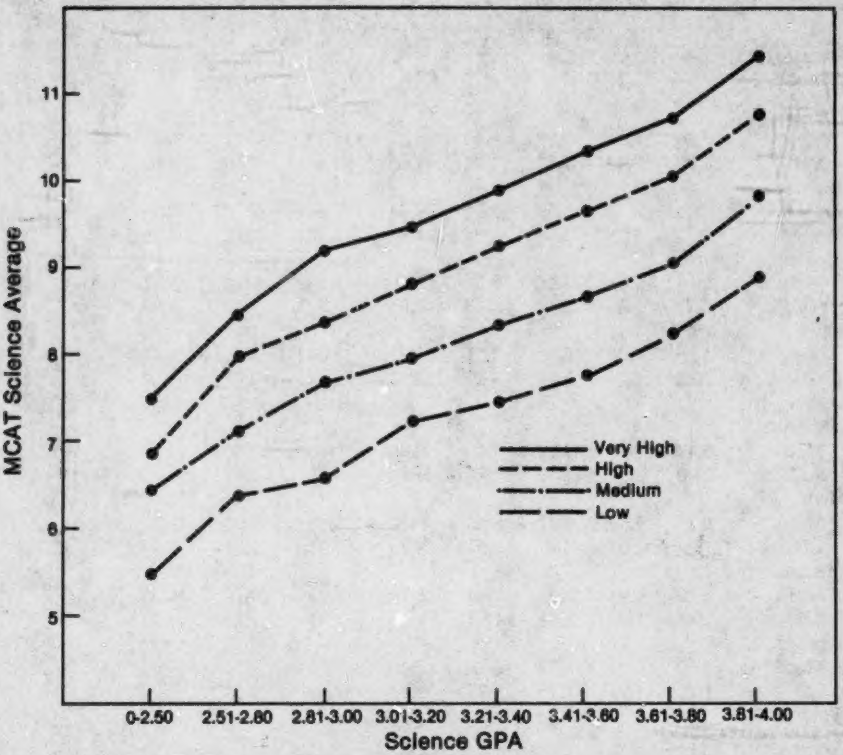

FIGURE 1

Medical College Admission Test (MCAT) science average by undergraduate science grade-point average (GPA) and undergraduate college selectivity, U.S. medical schools, 1981–82 entering classes.

ilarities in the overall trend, there are systematic differences in the MCAT performance of applicants with identical GPAs but from colleges that differ in selectivity. These differences tend to be fairly constant at each point in the GPA scale; they range from 2 to 2.5 scale score points between the low selectivity schools and the very high selectivity schools. One result of this is that whether or not a particular MCAT score is considered to be consistent with GPA depends on the college or university from which the GPA is derived. For example, a 9 in chemistry may be a score typical of those with science GPAs of 3.8 to 4.0 from low selectivity colleges (mean = 9.04). However, this is closest to the score expected of those with science GPAs of 3.6 to 3.8 from medium selectivity colleges (mean = 9.14), of 3.2 to 3.4 from high selectivity colleges (mean = 9.24), and of 2.8 to 3.0 from very high selectivity colleges (mean = 9.18).

These data support the use of MCAT scores for assisting in the evaluation of academic achievement of medical school applicants. The MCAT complements the information supplied by undergraduate grades, by measuring achievement with standard content and a standard scale. A direct correction or weighting of the GPA, by use of the Astin index or some other measure of quality, can result in a more internally consistent GPA measure. However, this has a social consequence that many consider undesirable. Weighted GPAs tend to place an artificial ceiling on the evaluation of achievement for applicants from colleges with lower selectivity scores. The MCAT offers the opportunity for these applicants to demonstrate their achievement irrespective of their undergraduate college origins and, therefore, provides for the social mobility that excessive reliance on the undergraduate college attended might restrict.

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12/2/83

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Index to Volume 58

Journal of Medical Education

Volume 58 • Number 12 • December 1983

Developing a Clinical Faculty Practice Plan in a University Clinic—Randolph W. Thrower and James K. Hasson, Jr. 921

Program for Increasing Enrollment of Early Acceptees in Medical School—Nancy E. Gary and G. Craig Rosevear 929

Family Medicine Home Visit Programs in U.S. and Canadian Medical Schools—Linda Z. Nieman and James G. Jones 934

Six Years of Experience Using Patient Instructors To Teach Interviewing Skills—Paula L. Stillman, Michele Y. Burpeau-Di Gregorio, Glen I. Nicholson, Darrell L. Sabers, and Alfred E. Stillman 941

Clinical Problem-Solving Skills of Internists Trained in the Problem-Oriented System—David Babbott and William D. Halter 947

Patients' Perspectives of Behavioral Science Care by Family Practice Physicians—Claire H. Clark, Thomas L. Schwenk, and Cynthia X. Plackis 954

Communications: The First-Year Resident Selection Process—Robert Adler and Keith L. Gladstien 962

A Further Assessment of Medical School Stress—Camille Lloyd and Nanette K. Gartrell 964

Perceptions of Instructors and Students of Instructors' Roles—E. Virginia Calkins and Richard Wakeford 967

Editorial: Self Renewal in the Academic Medical Center Through Creativity and Innovation 970

Datagram: Financial Assistance for Medical Students, 1982–83 973

Book Review 976

Bibliography 979

Letters to the Editor 984

Index to Volume 58 985

Officers of the Association and Members of the Executive Council, 1983–84

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Family Medicine Home Visit Programs In U.S. and Canadian Medical Schools

Linda Z. Nieman, Ph.D., and James G. Jones, M.D.

Abstract—In this report, the authors describe the current status of home visit training programs in family medicine education in U.S. and Canadian medical schools. Thirty-two percent of the 137 medical schools with programs in family medicine provide opportunities for students to visit patients in their homes. In most of these schools, visits are mandatory, are made by one student, occur at more than one level of study, and require a written report by the student. Information gathered during the visit becomes part of the patient's medical record and is shared with health care providers. Physician participation in the visit is most frequently optional and an alternative to the participation of nonphysician faculty members or allied health professionals. Ninety-four percent of the respondents whose schools have programs report that students, faculty members, and patients have positive attitudes toward the visit. Suggestions for improving and/or designing home visit programs are provided based on the data accumulated during the study.

A review of the literature on the topic of home visits as a feature of medical practice in North America and Britain revealed that the decrease in house calls and a concomitant rise in the frequency of hospital and office visits have significantly altered the context in which the doctor-patient relationship now occurs (1–3). Writing about the house call's decline, Cauthen (3) notes that while many in the medical profession "celebrate" the end of a supposedly outdated feature of medical practice, others in the same profession demonstrate a renewed interest in revitalizing the home visit. This renewal of interest has had two results. First, guidelines have been written for making effective use of the house call (3–6). Second, McWhinney (7), Phillips (8), and Gray (9) have stated emphatically that it would be professionally and politically unwise for family physicians to eliminate the house call. They consider the home visit fundamental both to the principles of family medicine and to the public desire for personalized, good medical care.

Until recently it has been unclear how decreased house calls have affected family medicine education. Cognizant of the possible impact of the declining house call upon graduate family medicine education, Graham and Krick surveyed U.S. family medicine residency programs to determine the status of "family home assessment" within graduate education (10). Their results indicated that the

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house call still remained a standard part of residency training. Educators from 86 percent of the responding programs stated that their programs included home visits.

In contrast to the attention given house calls at the graduate level of family medicine education, little has been written concerning home visitation at the undergraduate medical education level. The purpose of this study is to describe home visit programs as a feature of family medicine education in U.S. and Canadian medical schools.

Methods

Home visit programs were defined as one or more visits made by medical students to the homes of designated patients in order to satisfy either explicit or implicit family medicine instructional objectives. For purposes of this study, the terms "house call" and "home visit" were considered synonymous. A 17-item questionnaire was developed by the authors in order to answer four major questions: Are home visits part of the programs of departments of family medicine? What is the characteristic structure and content of the programs? How are the programs evaluated, and what are the results of such evaluations? Are these home visits made part of actual patient care? Of the 17 items, three were designed to answer the first question, six to answer the second question, seven to answer the third question, and one to answer the fourth question. Sixteen items were forced-choice responses from which respondents selected the most appropriate answers to describe their programs. The final item, concerning evaluation of home visits, asked respondents to list program strengths and weaknesses.

The survey was mailed in the summer of 1982 to 138 "family practice contacts" identified from sources provided by the American Association of Family Practice and by the Canadian Board of Physicians. A total of 122 individuals represented U.S. schools, and 16 represented Canadian schools. All medical schools which were listed as having "no plans" for family medicine were omitted from the mailing. Of the 138 questionnaires, one was eliminated from the study because of an inaccurate address. Respondents returned 117 of the 137 surveys with valid addresses, producing a response rate of 85 percent. One additional survey which contained information concerning a residency program was eliminated, leaving 116 in the final sample.

Frequency distributions, percentages, and cross tabulations were the major quantitative procedures. An additional qualitative technique, which Krippendorf refers to as attribution analysis, was used to analyze data regarding perceptions of program strengths and weaknesses (11).

Results and Evaluation

Analysis of the returned surveys revealed that home visit programs were part of family medicine education in 37 (32 percent) of the responding medical schools. Of the schools with programs, six were Canadian and 31 were American schools, including one Puerto Rican school. An additional 10 percent of the responding schools previously had conducted home visits but no longer had the program. The major factors suggested by the respondents for the demise of home visits were a lack of funds, lack of faculty, and logistical constraints. Only one of the schools which had ended home visits listed the lack of appropriate patients and families as a cause of termination.

The remainder of this discussion summarizes information obtained from the 37 medical schools with existing home visit programs. Respondents from these medical schools answered several items regarding program structure, including whether or not the program was mandatory, in which year or years of education the home visits occurred, and who participated when these visits were made. Sixty-five percent of the schools with programs had mandatory home visits. An additional 5 percent mandated home visits in one year and made them optional in other years.

Regarding the point at which students participate in the home visit program, more than 40 percent of the correspondents checked the first year of medical school and 40 percent designated the third year of medical school as the starting year. Eleven percent indicated that the program began during the second year, while only 8 percent stipulated a program beginning in the fourth year of study. In 70 percent of the schools, the programs were described as multiyear. Only 5 percent of the respondents reported that their programs occurred in all four years of medical education.

In schools which prescribed visits during the first year of study, home visits were part of the family medicine curriculum in one or more subsequent years. All respondents who designated beginning home visits during the first year also reported home visits during other years. Six percent of the 15 schools which began home visits in the third year continued visits during the students' fourth year of study. None of the schools which initiated programs in the students' second year continued home visits in subsequent years.

One assumption made prior to the study was that it was possible to emphasize, either intentionally or unintentionally, particular professional or peer relationships by stipulating that certain individuals or groups would make the visit. The following possibilities for participation were listed on the questionnaire: one student, two students, groups of more than two students, students and faculty physician, students and faculty nonphysician (including allied health personnel). Respondents checked all choices that applied to their programs and wrote in others that were not listed.

Figure 1 illustrates that the two most usual forms of the visit were (*a*) for a student to visit the family with a physician and (*b*) for one student to visit a family by himself. The physician's participation with the student usually was offered only as an alternative option to the participation of others, including students, nonphysician faculty, and allied health personnel. The student's visit by himself usually occurred as a mandatory type of visitation.

The questionnaire contained a list of words and phrases describing the content and skills taught during the home visit. When responding to these items, respondents checked an average of three words and phrases. Validating Pellegrino's statement that the family is the subject matter of family medicine (12), 78 percent of the respondents named the family as their home visit's central concept, while 48 percent named the impact of chronic illness as a major concept.

The frequencies for specific skills taught by means of the home visit programs are illustrated in Table 1. The skills are divided into three categories. Between 49 and 76 percent of the programs taught the first category of general skills. The second category consists of skills which, excepting analysis of nutritional resources, Smilkstein included in the analysis of resources available to the family (13). These skills were taught by 65 to 87 percent of the programs. Clinical skills were taught by 22 to 54 percent of the responding schools.

Since guidelines for undergraduate

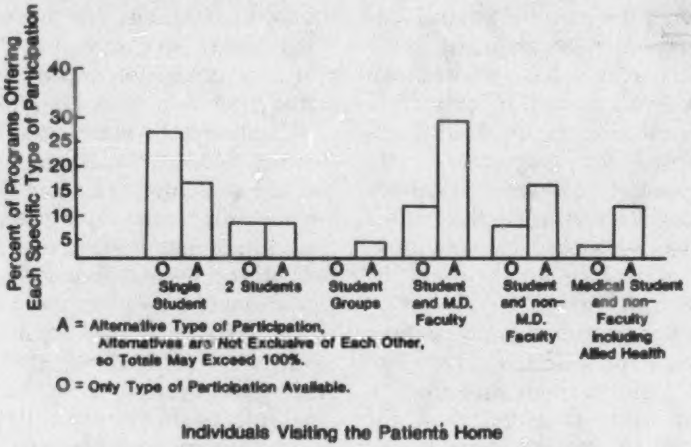

FIGURE 1

Participants in family medicine home visit programs in American medical schools.

TABLE 1

Skills Taught by Family Practice Departments in 37 American Medical Schools During Home Visit Experiences

Skills	No. of Departments
General	
Observation	28
Communication	19
Comforting ill and homebound	18
Analysis of family resources	
Social resources	32
Medical	31
Cultural resources	30
Educational	27
Nutritional	27
Religious	26
Economic	24
Medical	
Medical data-gathering	20
Analysis of health beliefs	19
Patient education	17
Analysis of previous medical visits	14
Developing a plan for preventive medicine	13
Assisting in prenatal/postnatal care	8
Conducting medical therapy	8

family medicine education usually specify that courses should be evaluated, four basic types of evaluations were listed on the questionnaire: evaluation of students, evaluation of the home visit program by students, program evaluation by the faculty, and a formal (written) evaluation of the program by patients. Eighty-six percent of the responding schools indicated that they used some form of evaluation. Further, 62 percent of those with evaluations reported that they used more than one type of evaluation.

Assessment of students occurred in 100 percent of the schools which incorporated an evaluation component into their home visit program. The most frequent form of student evaluation, occurring in 66 percent of these schools, was a faculty critique of the student's written report. The second most frequent form (35 percent) was an oral presentation by the student to faculty members. The least popular form, occurring in 6 percent of the schools, was a critique by faculty members of videotaped interviews conducted by students in the patients' homes. Program assessment was conducted in 59 percent of the schools that evaluated their home visit. In all medical schools where program evaluation occurred, the students assessed the program. Faculty members made evaluations in 53 percent of the schools. Not a single school with a home visit program had patients to respond in writing to questions about the quality of the program.

The authors provided correspondents with a Likert-type scale and asked them to use the scale to summarize student, faculty, and family attitudes toward the visit. In the 10 schools where faculty members evaluated the program, respondents indicated that attitudes toward the home visit were either positive or very positive. One of the 19 schools that evaluated student attitudes toward the program reported negative evaluations. Ninety-four percent of the 37 schools, including those schools that did not report a formal evaluation component, reported positive attitudes toward the visit.

Three definite areas of weakness and three of strength emerged from analysis of the home visit programs. The three areas of program weakness, ranked in order of the frequency, were: insufficient program design due to the lack of goals and objectives, defined learning activities, and objective assessment measures; academic constraints placed upon the program, including the fact that the program was not mandatory and offered no credit; and logistics, especially insufficient physician involvement.

The program strengths were: the home visit as an opportunity to expand the student's concept of the doctor-patient relationship—that is, "medicine is more than what occurs in the office" and "more than pathology"; the home visit as a strategy for forming and/or strengthening professional and collaborative relationships with physicians, nonphysicians, and allied health personnel; and the home visit as a strategy for teaching psychosocial and family systems concepts.

A final area of concern was the degree to which the visit was applied to the medical care of participating patients. Of the schools with programs, 41 percent either placed information gathered by the student in the patient's medical record or provided it to the patient's physician who could use it in planning patient care. The information collected by the first-year student was as likely to be incorporated into patient care as was the information collected by the third-year student.

Conclusions and Implications

It appeared at one time that the home visit would become extinct. However, graduate family medicine education programs and a host of other influences have begun to change the deemphasis of the home visit, and the house call is becoming an accepted component of the armamentarium of the family physician.

At the same time there has been a renewed interest in the house call in graduate family medicine education, there has been an underutilization of the house call at the undergraduate medical education level, according to the results of the study reported here. This was true for both the United States and Canada. Existing programs varied considerably. However, the survey indicates several salient characteristics: (*a*) an almost equal tendency to utilize house calls as a preclinical or a clinical experience; (*b*) a purposeful development via program structure and content of the student-family relationships with almost no provision for a formal continuity relationship; (*c*) an apparent less purposeful development of other professional relationships, such as the relationship between the student and faculty physicians; (*d*) the provision for multiple formal program evaluations that do not include evaluations by the patient. The survey leaves unclear why programs begin and end when they do, why other interpersonal relationships are not specifically developed, and how respondents determined that patients' attitudes are positive.

Beyond their use in describing existing programs, the data from this study can be used to answer two closely related questions that have broad implications.

Is the house call a useful instructional experience for medical students? The results indicate that there is a high degree of conviction among family practice department leaders in the United States and Canada that current programs are useful experiences. Respondents noted that home visit programs are opportunities to learn particular skills and concepts as well as to encourage positive attitudes toward working with individuals and families.

What should an ideal home visit program include? The answer to the second question is developed primarily from the strong positive points of existing programs. An "ideal" program is a continuity experience that begins when a first-year student is assigned a family. Members of the family agree to participate in the educational programs and are aware that they are, in essence, teachers of medical students. Students visit the same family at home and in the physician's office several times over the four years of study. One major goal of the ideal program is to teach the student firsthand the principles of family medicine: family, community, continuity, comprehensiveness, and prevention. Findings made by the student during visits are recorded in the patient's record and shared in conferences with the providers, course directors, and family. These conferences are designed to improve family health and to develop the student's professional identity. An individual student makes some visits by himself and plans other visits as a collaborative effort with the medical faculty and/or allied health personnel. Program goals, objectives, and materials are specified in advance. When decisions are made to refine ideal programs, a complex of evaluations is systematically taken into account, including program evaluations by students, the faculty, and patient participants.

No such ideal program apparently exists. Nevertheless, the description is offered as a practical guide to family practice faculty members who contemplate either beginning home visits or improving an existing program. Given the renewed interest in the house call, the time may be appropriate for a forum at which the home visit would be discussed in detail and materials relating to the topic would be shared.

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Clinical Problem-Solving Skills of Internists Trained in the Problem-Oriented System

David Babbott, M.D., and William D. Halter

Abstract—In the study reported here, the authors test the hypothesis that internists completing residencies in a highly structured, problem-oriented residency program approach clinical problem-solving differently than do internists whose residencies were not problem-oriented. The vehicle for the study was the certifying examination of the American Board of Internal Medicine (ABIM) in 1978, 1979, and 1980. Performance on patient management problems (PMPs) and multiple-choice questions was analyzed for candidates for ABIM certification whose residency had been problem-oriented, for candidates whose residencies had been classified as nonproblem-oriented, and for the national pool of U.S. medical graduates. Internists trained in the problem-oriented residency program achieved significantly higher PMP scores than did the national pool in two of the three years and on true-false questions in one of the years. No differences were detected between the problem-oriented group and their nonproblem-oriented colleagues.

Numerous studies have been made in an attempt to determine relationships between physicians' prior educational experience and subsequent performance in practice or on standardized nationally administered examinations. In a 1981 report, Benson and colleagues analyzed test scores of three categories of candidates for certification by the American Board of Internal Medicine (ABIM): graduates of U.S. medical schools (USMGs), U.S. citizen graduates of foreign medical schools (USFMGs), and all other foreign medical school graduates (FMGs) (1). Pass rates of the USMGs taking the ABIM certifying examination for the first time were the highest, ranging from 79 to 82 percent, compared with 15 to 38 percent for the USFMGs and 27 to 45 percent for the FMGs. In every year of the study (1975–1980), the USFMGs achieved the lowest pass rate of the three categories of candidates.

In 1982 Gonnella and Veloski studied the impact of various types of first-year residency programs on scores achieved by graduates of Jefferson Medical College in Philadelphia, Pennsylvania, on Part III of the National Board of Medical Examiners (NBME) examinations (2). Correcting for earlier performance on Part II of the NBME examinations, they found that Jefferson graduates completing first-year residency positions in the specialties of pediatrics, surgery, obstetrics-gynecology,

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psychiatry, or pathology achieved lower NBME Part III scores than did colleagues completing the more broadly based flexible, family medicine, and internal medicine first-year residency programs.

Bell, working for the Rand Corporation under a U.S. Health Resources Administration contract, studied ABIM test scores of 438 graduates from nine U.S. medical schools taking the examination for the first time. He was seeking to determine and identify the magnitude of factors related to variation in ABIM scores (3). Bell stated that "quite significant differences were found in scores among the nine schools (but) a substantial amount of this difference is due to the quality of students admitted by the institutions." Looking at possible effects of internal medicine residency training on ABIM performance, Bell concluded, "No relationship was found between ABIM exam scores and postgraduate training. None of the available variables do a good job of differentiating among programs. The only distinctions are such crude ones as the type of hospital at which training was done (major teaching or limited teaching) and the type of internship (specialized or rotating). Further, the quality of postgraduate training is highly dependent on previous achievement, which makes it difficult to separate the effects of the two periods."

In 1968 the Medical Service of the Medical Center Hospital of Vermont in Burlington incorporated the problem-oriented medical record as the vehicle for documenting medical care on its clinical services. The problem-oriented system includes a defined data base, stipulates that all problems be identified and incorporated onto a problem list at the highest defensible degree of resolution, and requires that all progress notes be specifically coupled to problems on the problem list (4). In this manner, the clinicians' procedure in arriving at diagnostic and management plans is recorded. Thus, audits for thoroughness, analytic judgment, and efficiency of individual and team providers are made possible. Since the mid-1970s, audits have been incorporated into inpatient and ambulatory teaching in the Vermont residency program in internal medicine (5).

In 1978 the American Board of Internal Medicine first reported candidates' scores to program directors in terms of mean scores achieved by that program's former residents and the rank of the program relative to all programs expressed as a percentile. In 1978 the performance of candidates from the Vermont hospital on the patient management problem (PMP) section of the examination placed the Vermont program in the 66th percentile, in 1979 in the 85th percentile, and in 1980 in the 97th percentile. When these figures were reviewed, the question was raised as to a possible cause-effect relationship between the structured, problem-oriented emphasis of the Vermont residency program in internal medicine and successful performance of its graduates on the patient management problem section of the ABIM examination.

The study reported here extends Benson's and Bell's earlier studies and attempts to determine whether measurable relationships exist between the emphasis of the residency program on the problem-oriented system and performance on the multiple-choice questions (MCQs) and the patient management problem sections of the ABIM examination.

Methods

The American Board of Internal Medicine classifies medical residency programs as problem-oriented or nonproblem-oriented on the basis of: (*a*) the description of each program prepared by the program director for the ABIM and (*b*) the ABIM site visitor's evaluation of the program based on discussion with the program director and a sample of residents and review of clinical records on the medical service. The Accreditation Council for Graduate Medical Education (ACGME) classifies hospitals as limited, graduate, or major affiliates of medical schools on the basis of information provided by deans of medical schools (6). The residency program in internal medicine at the Medical Center Hospital of Vermont is classified by the ABIM as problem-oriented and by the ACGME as a major affiliate of the University of Vermont College of Medicine. Among the 28 candidates for ABIM certification from the Medical Center Hospital of Vermont in 1978, 1979, and 1980, only three were graduates of the University of Vermont College of Medicine. The present study compared the test performances of residents from the Vermont program who took the ABIM certification test in 1978, 1979, and 1980 with a northeast pool and the national pool of candidates during this three-year period. The northeast pool consisted of residents from six hospitals in the northeast quadrant of the United States, each classified by the ACGME as a major affiliate and classified by the ABIM as nonproblem-oriented. The national pool was composed of all USMG candidates for certification during the period of 1978–1980, regardless of the status of medical school affiliation or the problem-oriented emphasis of their prior residency programs.

The American Board of Internal Medicine examination consists of three types of multiple-choice questions in addition to patient management problems. The former include the single-best-answer (Type A), matching questions (Type M), and multiple true-false (Type X) questions. The ABIM believes that the single-best-answer and matching questions tend to measure "aspects of clinical judgment, or the ability to synthesize data." Multiple true-false questions are believed to measure "aspects of knowledge." Patient management problems are designed to measure "aspects of clinical problem-solving" (7). Details of PMP construction and scoring are provided elsewhere (8). In order to ensure stability of standards from year to year, the ABIM utilizes a reference group which consists of graduates of U.S. and Canadian medical schools taking the certifying examination for the first time.

The initial portion of the present study focused on the MCQ and PMP performances of Vermont, northeast pool, and national pool candidates. Table 1 summarizes mean scores on multiple true-false questions achieved by the Vermont residents, the northeast pool, and the national pool. Table 2 provides comparable data for patient management problems for each of the three years. Data in both tables 1 and 2 were compared using anal-

TABLE 1

Performance on True-False Questions of Candidates for American Board of Internal Medicine Certification from the Medical Center Hospital of Vermont, the Northeast Pool, and the National Pool, 1978, 1979, and 1980

Year	Vermont Hospital			Northeast Pool*			National Pool		
	Mean†	S.D.	No.	Mean†	S.D.	No.	Mean†	S.D.	No.
1978	476.87	61.55	9	508.76	113.91	69	435.91	120.70	7,842
1979	495.98	116.51	10	526.01	101.91	103	425.94	135.26	7,523
1980	524.25	67.36	9	490.33	118.74	94	421.21	137.26	7,808

* Consists of residents from six affiliated hospitals in the northeastern United States.

† The mean for the reference group is 500, with a standard deviation of 100.

TABLE 2

Performance on Patient Management Problems of Candidates for American Board of Internal Medicine Certification from the Medical Center Hospital of Vermont, the Northeast Pool, and the National Pool, 1978, 1979, and 1980

Year	Vermont Hospital			Northeast Pool			National Pool		
	Mean*	S.D.	No.	Mean*	S.D.	No.	Mean*	S.D.	No.
1978	501.33	91.56	9	515.64	99.65	69	423.00	134.56	7,842
1979	530.91	81.14	10	502.92	103.88	103	421.87	140.96	7,523
1980	553.78	71.21	9	492.57	121.02	94	426.28	136.51	7,808

* The mean for the reference group is 500, with a standard deviation of 100.

yses of variance methods. Correlations between single-best-answer, matching, and multiple true-false questions and patient management problems for the three groups of candidates are summarized in Table 3.

The second portion of the study examined PMPs more closely. In this section of the study, 19 department of medicine faculty internists served as criterion groups to score PMPs and to evaluate Vermont and northeast pool candidates as they had actually worked through PMPs during their certification examinations in 1978, 1979, and 1980. Nine teams of ABIM-certified, full-time faculty members were recruited for this purpose. Each team consisted of one subspecialist in the discipline of the three PMPs reviewed by that team, one general internist, and the principal investigator (also a general internist) who served on each of the nine teams. Initially, each member individually worked through a PMP, selecting indicated options by erasure of an opaque overlay and avoiding those he felt to be noncontributory or deleterious to the management of the case. He next uncovered the overlay from each option he had not originally selected. Then, knowing all the options, he rated each on a scale of strongly indicated to strongly contraindicated, using the same guidelines as those followed by the ABIM criterion groups.

TABLE 3

Correlation Between Scores on Multiple-Choice Questions and Scores on Patient Management Problems of Candidates for American Board of Internal Medicine Certification from the Medical Center Hospital of Vermont, the Northeast Pool, and the National Pool, 1978, 1979, and 1980

Problems	1978	1979	1980
Vermont Hospital			
Type A—PMP*	.75	.72	.61
Type M—PMP†	.41	.65	.61
Type X—PMP‡	.26	.60	.28
Northeast Pool			
Type A—PMP*	.73	.64	.70
Type M—PMP†	.47	.42	.55
Type X—PMP‡	.68	.67	.73
National Pool			
Type A—PMP*	.77	.71	.74
Type M—PMP†	.61	.57	.64
Type X—PMP‡	.75	.74	.75

* Single-best-answer—patient management problems.

† Matching questions—patient management problems.

‡ Multiple true-false—patient management problems.

Next an effort was made to determine whether the Vermont faculty members could differentiate their former residents from residents of the northeast pool, as each group had actually worked through that PMP while taking the ABIM examination. Photocopies of the PMPs were prepared and coded to obscure the identity of the candidate and his prior residency program. Each faculty member evaluated 30 candidates' PMPs for the quality of the history options selected, the conduct of the physical examination, the critical laboratory studies obtained, the dangerous and risky actions avoided, diagnostic acumen, management and patient instructions, and overall competence on the PMP. A 9-point scale was used; 7 to 9 represented excellence, 4 to 6 represented adequacy, and 1 to 3 represented inadequacy. To complete this task, 27 PMPs were studied and over 2,400 photocopies of PMPs were rated. Table 4 summarizes the Vermont faculty members' evaluations of Vermont and northeast pool PMPs. Mean ratings for each group were compared using *t*-tests.

Results

Table 1 reveals an apparent increase in the mean multiple true-false scores for the Vermont group over the three-year period. This trend, however, was not statistically significant. Additionally, no statistically significant trends were observed for the northeast pool, and there was no significant difference between the multiple true-false scores of the Vermont residents and the northeast pool. The national pool, on the other hand, did demonstrate a significant decline ($p < 0.05$) during the period of study, and the Vermont residents achieved significantly higher scores than the national pool in 1980 but not in the two previous years.

Table 2 shows that the Vermont residents' upward trend in performance on the patient management problems in 1978, 1979, and 1980 was not statistically

TABLE 4

Evaluation by Vermont Faculty Members of Performance on Patient Management Problems of Candidates for American Board of Internal Medicine Certification from the Medical Center Hospital of Vermont and the Northeast Pool, 1978, 1979, and 1980

Year/Problems	Vermont Hospital			Northeast Pool		
	Mean*	S.D.	No.	Mean*	S.D.	No.
1978						
History	6.301	.516	9	6.499	.808	20
Physical	6.750	.992	9	6.917	.843	20
Laboratory	6.070	.423	9	6.062	.371	20
Avoidance of risk	5.904	.464	9	6.157	.625	20
Diagnosis	6.289	.543	9	6.414	.481	20
Management	5.562	.416	9	5.528	.649	20
Overall	5.446	.431	9	5.506	.561	20
1979						
History	6.600	.640	10	6.472	.820	20
Physical	—	—	0	4.000	—	1
Laboratory	5.735	.562	10	5.667	.647	20
Avoidance of risk	6.860	.985	10	6.660	.848	20
Diagnosis	6.489	.963	10	6.433	.635	20
Management	5.847	.922	10	5.750	.717	20
Overall	5.755	.815	10	5.562	.685	20
1980						
History	6.556	.542	9	6.586	.654	20
Physical	6.800	.628	9	6.787	.709	20
Laboratory	6.396	.382	9	6.649	.361	20
Avoidance of risk	6.534	.657	9	6.324	.748	20
Diagnosis	6.562	.465	9	6.684	.421	20
Management	5.605	.577	9	5.356	.713	20
Overall	5.649	.524	9	5.466	.616	20

* A 9-point scale was used where 7 to 9 = excellence, 4 to 6 = adequacy, and 1 to 3 = inadequacy.

significant. Similarly, the northeast pool's decline in PMP performance over this period was not statistically significant, and the Vermont residents' scores on patient management problems did not differ significantly from the northeast pool scores in any of the three years. The Vermont group did achieve significantly higher PMP scores than the national pool in 1979 and 1980 ($p < 0.05$) but not in 1978.

Table 3 shows that the national pool demonstrated the most consistent year-to-year correlation between each of the types of MCQs and PMPs. In contrast, the Vermont group demonstrated the greatest annual inconsistencies in correlation between MCQ and PMP scores. In fact, the small sample sizes and the instability of relationships for the Vermont group minimized the utility of additional statistical comparisons between the Vermont MCQ-PMP relationship and that of the northeast or the national pool.

Table 4 discloses that the Vermont and northeast pool candidates received comparable evaluations by the Vermont faculty members and that interrater discrepancies were rather high for these small groups. It is not surprising, therefore, that *t*-test comparison of these groups revealed no significant differences in any of the seven categories evaluated.

Discussion

The earlier cited studies related undergraduate and/or graduate medical education background to subsequent overall performance on Part III of the NBME examinations or the ABIM certifying examination. In the study reported here, the authors analyzed ABIM test results in greater detail, seeking to determine more subtle differences than overall composite scores achieved by different groups of candidates for certification.

The method of analysis used did reveal significant differences between the Vermont-trained internists and the national pool in both aspects of problem-solving (1979 and 1980) and aspects of knowledge (1980). Despite the upward trend in the Vermont residents' PMP scores and the downward trend in PMP scores by the northeast pool, differences between these groups did not reach the level of statistical significance when performance was evaluated by ABIM test score analysis or by the Vermont faculty members. Scores on the examinations of the National Board of Medical Examiners were not available to enable further comparison between the Vermont residents and the northeast pool. The small size of the Vermont group may have contributed to the negative results of the latter analyses. It is evident that data from the study reported here do not enable conclusions concerning advantages or disadvantages of problem-oriented residency program emphasis. The use of blinded ABIM test scores for educational research and the methodology described in this article may prove useful to further research efforts seeking to correlate characteristics of undergraduate or graduate medical education with performance on the American Board of Internal Medicine certifying examinations.

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DATAGRAM

Financial Assistance for Medical Students, 1982–83

Each year the Association of American Medical Colleges (AAMC) collects, through the Liaison Committee on Medical Education Annual Questionnaire, data on financial assistance available to medical students. The following summary is the first of an annual series to be published in this journal.

The 1982–83 report contains several facts which are difficult to interpret. While costs of medical education continued to increase, fewer students received financial aid than in the previous year, and the total aid disbursed was also down. At the same time, schools indicated that a higher level of financial support was needed for their students. Apparently, many students chose to limit their debts in the face of rising costs and decreasing financial assistance by curtailing their expenditures, working, and using family or other sources of assistance unknown to the schools.

Table 1 portrays the financial assistance awarded to medical students from all sources known to the 118 schools reporting in academic year 1982–83. For comparison, identical information for the 1981–82 academic year is included. The most striking aspect of these data is that the total amount of financial assistance obtained by medical students declined $25.4 million, or 5.5 percent, in 1982–83 compared with the previous year. This drop is the only reduction since data on student financial assistance were first collected from the schools in 1954 and is in contrast to the increases in previous years, as shown in Table 2. Moreover, this decrease took place in a year when the estimated total first-year cost to the student for a medical education rose on the average of $2,293, or 14.4 percent, to $18,210 at private schools and $900, or 10.4 percent, to $9,588 for state residents at public schools.

The second notable trend reversal was the finding that 5,882 fewer students received financial aid (a drop from 78 to 67 percent of total enrollment). However, the number of students who applied for aid from the schools and who were determined by the schools to have financial need increased by 3,387, or 13.1 percent. The dollar amount which financial aid officers calculated to be needed by these students rose by $53.6 million, or 22.4 percent. The portion of the calculated need that was not provided for by financial aid grew by $16.5 million, or 65.1 percent, to $27.4 million.

The causes for the decline in the amount of student assistance and the number of aid recipients reported in 1982–83 are not clear. The idea that medical schools may be accepting more students able to pay their own way is contradicted by the relatively equal drop across all classes and not just for first- and/or second-year students. A likely explanation is that due to an increased appreciation of the implications of debt, students have become more prudent in borrowing or have turned to other sources of financial aid outside of the normal mechanisms handled through medical schools.

The principal sources of the drop in student assistance were the National Health Service Corps (NHSC) scholarships, down $15.2 million, or 39.3 percent, from the previous year, and the Guaranteed Student Loan (GSL) Program, down by $45.5 million, or 19.9 percent, from 1981–82. The fall in NHSC scholarships is due to the phaseout of the program, and there were virtually no new awards for the past two years. The decrease in total GSLs may have been influenced by a requirement, instituted in October 1981, that students with family incomes over $30,000 had to demonstrate financial need to be eligible to borrow. This requirement may have disqualified some students from obtaining these loans and, along with the proposal of the Reagan Administration that graduate and professional students be declared ineligible to participate in the program, discouraged others from applying. These circumstances may have diverted students to other resources, such as the program of parental loans to undergraduate students

TABLE 1

Sources of Medical Student Financial Assistance

Sources	1981–82 Total Amount	1981–82 Number	1981–82 Average Amount	1982–83 Total Amount	1982–83 Number	1982–83 Average Amount
Scholarships						
Administered by schools						
Exceptional financial need	$ 4,899,584	418	$11,721	$ 2,448,861	172	$14,238
Medical Scientist Training Program	7,726,685	710	10,882	7,910,675	662	11,950
School funds	27,180,407	11,418	2,380	30,759,501	13,297	2,313
Other scholarships	9,062,014	6,248	1,450	9,174,466	6,283	1,460
Subtotal	48,868,690			50,293,503		
Not administered by schools						
Armed Forces health professions	44,809,664	3,263	13,733	48,840,030	3,171	15,402
National Health Service Corps	38,720,764,	2,882	13,435	23,474,403	1,556	15,086
National medical fellowships	912,300	766	1,191	682,610	730	935
Other (with service commitment)	10,959,568	2,196	4,990	9,719,366	1,824	5,329
Subtotal	95,402,296			82,716,409		
Total Scholarships	144,270,986			133,009,912		
Loans						
Administered by schools						
Health professions loans	24,347,510	10,245	2,376	22,949,645	9,551	2,403
Guaranteed student loans	13,775,154	2,605	5,287	4,709,462	984	4,786
National direct student loans	12,737,413	7,216	1,765	14,909,736	8,057	1,851
Loans from school funds	9,624,746	6,283	1,531	16,822,076	7,495	2,244
Subtotal	60,484,823			59,390,919		
Not administered by schools						
Guaranteed student loans	214,923,028	43,809	4,905	178,536,448	37,624	4,745
Health education assistance loans	33,166,499	4,701	7,055	50,436,252	6,554	7,695
PLUS loans	2,004,325	752	2,665	11,256,451	3,930	2,864
Other loans	9,095,526	3,678	2,472	5,986,290	2,476	2,418
Subtotal	259,189,378			246,215,441		
Total loans	319,674,201			305,606,360		
College Work Study Program	1,482,911	1,274	1,163	1,401,763	1,092	1,284
Grand Total	465,428,098			440,018,035		

TABLE 2

Changes in Financial Aid to Medical Students, 1973–74—1982–83

Academic Year	Total Assistance	Increase/Decrease from Previous Year: Amount	Increase/Decrease from Previous Year: Percent
1982–83	$440,018,035	−$25,410,063	−5.5
1981–82	465,428,098	+63,516,210	+15.8
1980–81	401,911,888	+63,867,301	+18.9
1979–80	338,044,587	+73,921,423	+28.0
1978–79	264,123,164	+57,734,014	+28.0
1977–78	206,389,150	+41,131,954	+24.9
1976–77	165,257,196	+16,471,317	+11.1
1975–76	148,785,879	+29,438,257	+24.7
1974–75	119,347,622	+29,940,286	+33.5
1973–74	89,407,336	—	—

(PLUS), that are available both to medical students and their parents.

Total funds in the scholarship category dropped $11.3 million, or 7.8 percent, from the previous year. After the $15.2 million reduction in NHSC scholarships, the greatest loss was $2.5 million in the Exceptional Financial Need Scholarship Program. Of the four scholarship sources showing gains, Armed Forces health professions scholarships led the way at $4.0 million.

Total loan funds awarded were $14.1 million, or 4.4 percent, less in 1982–83 than in 1981–82. Aside from the $45.5 million decrease in the GSL Program, the major loss was $3.1 million in "other loans" from sources outside the school. The greatest gains were: health education assistance loans (HEAL), $17.2 million; PLUS loans (which presumably went more often to parents than to students), $9.3 million; and school loans, $7.2 million. HEAL increased by only about 50 percent, compared with a more than 100 percent increase ($17.9 million) a year ago. This slowing of the HEAL growth rate suggests that some students opted for other sources of support rather than borrow from this relatively high-interest program.

The mean educational debts of senior students reported on the questionnaire increased 18.9 percent, from $20,116 to $23,914, compared with an 11.1 percent growth from $18,102 the previous year. These figures are supported by data provided by graduating seniors on the annual AAMC Graduation Questionnaire, which disclosed that debts for seniors went up 12.3 percent from $21,051 in 1981–82 to $23,647 in 1982–83. The number of students reporting educational debts of $30,000 or more increased 44.4 percent, from 1,504 to 2,172, or 13.5 percent of the graduating class.

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Evaluating Medical School Graduates of a Reduced Course Program: A Preliminary Report—Janet A. Weston and Steven L. Dubovsky 1

Stress in Junior Medical Students: Relationship to Personality and Performance—Bernard S. Linn and Robert Zeppa 7

A Small-Group Instruction Experiment in Medical Education—Daniel A. Brinton, Joseph Q. Jarvis, and Dona L. Harris 13

Evaluating the Medical History: Observation Versus Write-Up Review—James O. Woolliscroft, Judith G. Calhoun, Charles Beauchamp, Fredric M. Wolf, and Bruce R. Maxim 19

The Teaching of Cancer Medicine by Educational Objectives—Richard F. Bakemeier and W. P. Laird Myers 24

Effect of a Medical Care Evaluation Program on Physician Knowledge and Performance—J. A. Maxwell, L. J. Sandlow, and P. G. Bashook 33

A Third-Year Family Medicine Clerkship Based in an Academic Family Practice Center—Robert B. Taylor, Larry Camp, Jack M. Rogers, Jan Updike, and Carolyn Lyle 39

Teaching Psychosocial Issues to Pediatric House Officers—Frederick P. Rivara and Abby L. Wasserman 45

Communications: Relation of Students' Premedical Majors to Participation in Research in Medical School—Douglas C. Schaad, Peter H. Byers, Robert C. Davidson, Charles W. Dohner, N. Fred Shannon, and Thomas J. Cullen 54

A Graduate Program Designed for Medical and Other Doctoral Degree Applicants—Craig R. Johnson, K. Michael Cummings, Edwin A. Mirand, and M. Justa Smith 57

Measurement of Psychosocial Attitudes in Medical Students—Rhea L. Dornbush, Paul Singer, Edward J. Brownstein, and Alfred M. Freedman 59

The Psychiatry Club: Enhancing the Career Choice of Psychiatry—Jerald Kay 62

Editorial: New Threats to Tax-Exempt Financing of Student Loan Programs 64

Datagram: Net Patient Revenue at University-Owned Teaching Hospitals, 1981 65

Bibliography 69

Letters to the Editor 73

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The Teaching of Cancer Medicine By Educational Objectives

Richard F. Bakemeier, M.D., and W. P. Laird Myers, M.D.

Abstract—In this paper, the authors review the findings of a survey of cancer education activities in 110 U.S. medical schools conducted by the American Association for Cancer Education. Problems documented through this survey include the need for more coordination of multidisciplinary teaching; more exposure of students to patients with common malignancies, especially in an outpatient setting; and more uniform instruction in fundamental diagnostic procedures, such as proctosigmoidoscopy, bone marrow aspiration/biopsy, and indirect laryngoscopy. The present authors review these problems, particularly as they relate to educational functions of departments of medicine, and discuss an approach to the teaching of cancer medicine that employs the definition of educational objectives and relates these objectives to departmental teaching responsibilities. The authors suggest that the departments of medicine are in a unique position to stimulate and coordinate clinical cancer education by this approach.

During the past two decades, there have been widespread efforts in medical and dental schools to develop innovative, multidisciplinary cancer teaching programs, largely encouraged by grants from the National Cancer Institute's Clinical Cancer Education Program (recently renamed the Professional Oncology Education Program). Although these efforts have resulted in an increased interest in and awareness of cancer patients, certain problems pertaining to the teaching of cancer have become apparent, mainly as a result of a survey of cancer education activities in 110 U.S. medical schools (1). This Cancer Education Survey, completed in 1980 by the American Association for Cancer Education (AACE) and published by the National Institutes of Health, revealed that there continued to be a lack of coordination among medical school departments in the presentation of didactic material and a lack of facilitation of interdisciplinary teaching. Further, and perhaps of most importance, was the lack of well defined educational objectives in cancer education. This latter problem was addressed in a study jointly sponsored by the AACE and the National Cancer Institute, in which objectives were formulated for undergraduate education in oncology

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(2). These objectives are comprehensive and represent what students could learn if medical school departments pursued cancer teaching by defined objectives in a coordinated, interdisciplinary manner.

A worthy objective may be to teach about cancer in an interdisciplinary manner. But in the traditional departmental approach to medical education, who should take the lead? Departments of medicine have the most general, overall responsibility for teaching clinical medicine and usually teach and/or coordinate pathophysiology courses. Therefore, it seems logical that these departments should assume leadership in the coordinated teaching of oncology, if adequate faculty resources are available. The key words with respect to cancer education are "integrated," "coordinated," and "interdisciplinary." It is the purpose of the authors in this paper to suggest an approach to the teaching of cancer medicine which employs the concept of defined educational objectives within an interdisciplinary curricular effort. Departments of medicine could take the initiative in bringing about the necessary collaboration, working with an interdisciplinary cancer education committee. As background for the application of this approach to the teaching of oncology, the findings of the Cancer Education Survey are reviewed, with emphasis on the results pertaining to departments of medicine, and an example based on the results of the objective study is given.

Cancer Education Survey

In 1975 the National Cancer Institute (NCI) embarked on a survey of the status of cancer education in medical, osteopathic, and dental schools of the United States to assess the effect of its Clinical Cancer Education Program grants. These grants, begun in 1966, have provided funds to graduate schools for health professionals for the purpose of stimulating innovative, coordinated multidisciplinary cancer education programs.* The survey was designed to assess any unmet needs in the cancer education of medical, osteopathic, and dental students. Particular attention was paid to the teaching of principles of cancer diagnosis and management emerging from programs stimulated by the National Cancer Program undertaken in 1971 to develop resources which would effectively reduce the incidence, morbidity, and mortality of cancer in man. The American Association for Cancer Education was awarded a contract to conduct the survey. One of the present authors (RFB) served as the principal investigator, and the other served on the Editorial Advisory Committee of the project (1).

SURVEY DESIGN

The deans of all U.S. medical, dental, and osteopathic schools were contacted after consultations between the AACE Supervisory Committee for the Survey and the Association of American Medical Colleges, the American Association of Dental Colleges, the American Association of Colleges of Osteopathic Medicine, and an advisory committee consisting of deans of 15 professional schools. A total of 110 of 114 medical schools, 55 of 58 dental schools, and 8 of 9 colleges of osteopathic medicine agreed to participate. At each school, a faculty member was named by the dean to be the designated representative for the survey and to supervise completion of an institutional questionnaire.

Appropriate questionnaires were developed, tested, and distributed to acquire data on the following characteristics of professional schools relevant to student cancer education: administrative structure, physical facilities, faculty resources and attitudes, curriculum design, and student perceptions of the cancer curriculum and attitudes toward cancer patient care. The questionnaires were developed through discussions between the AACE committee and a consultant organization consisting of a group of academic political scientists experienced in survey design. Testing was done with sample groups of institutional representatives, faculty members, and students prior to final revisions and mailings of the questionnaires. Statistical analyses, including multiple-regression analyses, were applied to these data to clarify important determinants of effectiveness of cancer education. Institutional site visits were made to 44 schools to document further some of the information obtained from the questionnaire data. The schools were a nonrandom sample and varied in class size, location, age, and source of support (state-affiliated or private); the sample consisted of schools both with and without an NCI cancer center and an NCI clinical cancer education grant.

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* Personal communication, Margaret H. Edwards, M.D., chief, Clinical Manpower Branch, National Cancer Institute, March 8, 1983.

For faculty sampling, the designated representative provided a list of faculty members actively participating in the cancer education activities of any department within his institution. This resulted in a list of 2,450 cancer faculty members in 95 medical schools; the remaining 15 schools elected not to participate in this phase of the survey. The number of completed responses to the faculty and curriculum questionnaire from these faculty members totaled 1,311, for an overall response rate of 54 percent. These respondents included 201 members of basic science departments, 111 members of pathology departments, and 999 members of clinical departments, including 312 faculty members of departments of medicine. Information obtained through the questionnaire concerned existing research and teaching activities and those anticipated in the next five years, attitudes regarding the amount of cancer education in the curriculum, identification of deficiencies in the cancer-related component of the curriculum, and suggestions for reapportioning time and budgets devoted to cancer education.

Student sampling was performed by sending questionnaires to a random sample of 25 percent of the students just completing their preclinical courses and 25 percent of the students scheduled to graduate in approximately six months in each school. Completed responses were received from 1,861 preclinical students (60 percent of the sample) and from 1,757 clinical students (59 percent of the sample). The respondents were found to constitute a nationally representative sample of medical students by age, sex, state of residence, and career choices according to comparison with other surveys (3–5). In addition to demographic data, information obtained included the amount of exposure to various cancer education activities involving basic science topics, clinical topics, cancer patients by primary site, diagnostic and therapeutic procedures, use of therapeutic modalities, multidisciplinary treatment-planning conferences, and psychosocial aspects of cancer. Information was also collected about students' attitudes toward the amount and quality of cancer education activities, appropriate treatment of cancer patients, and the attractiveness of a variety of career choices, including oncologic specialties.

FACULTY RESPONSES

Among the 1,311 faculty members providing usable responses, 312 were respondents from departments of medicine (or internal medicine) at 95 medical schools to the faculty and curriculum questionnaire (6). Only 75 of these (from 44 schools) met the criterion for classification as medical oncologists, that is, by reporting that at least 90 percent of their patients had cancer. Thus, only a quarter of the cancer education faculty members from departments of medicine were medical oncologists. The rest represented a broad variety of physicians, including hematologists, gastroenterologists, endocrinologists, immunologists, and infectious disease specialists. Thirty-eight percent of these respondents were in institutions associated with an NCI cancer center, and 59 percent were in institutions awarded an NCI clinical cancer education grant.

Forty-six percent of all faculty respondents from departments of medicine and 80 percent of the medical oncologists thought that cancer was given too little emphasis in their schools' curricula. Faculty members of other departments responded similarly, with the extremes represented by surgery (38 percent) and radiology (65 percent). Responses to questions about increasing curriculum hours for various cancer topics are listed in Table 1. Responses to other questions indicated that the most important cancer education problem areas reflected by faculty responses when asked for rank-ordering were the quality of teaching, early diagnosis and prevention, multidisciplinary management of cancer, psychosocial aspects of cancer, and the multidisciplinary presentation of tumor biology.

The survey indicated that medical oncology units of departments of medicine often served as centers of coordination for multidisciplinary student cancer education. Thirty-nine of the 44 schools visited had a cancer education coordinator, and 23 of these schools specified that medical oncologists were responsible for this interdepartmental coordination. Eleven schools indicated that surgeons served this function, and two had appointed radiation oncologists. This reflected a change from a decade ago when a majority of cancer education coordinators were academic surgeons or pathologists. Factors contributing to this shift of responsibility include (*a*) the increase in the number of academic medical oncologists; (*b*) the variety of research interests of medical oncologists, both basic science and clinical, which puts them in contact with faculty members of both basic science and clinical departments; and (*c*) the broad spectrum of cancer problems with which medical oncologists deal, including early diagnostic evaluation, multidisciplinary therapy, and palliation of advanced cancer.

TABLE 1

Percentage of 1,311 Responding Cancer Faculty Members by Department from 95 Medical Schools Indicating Desirability of Increased Curriculum Hours for Various Cancer Topics, 1978

Cancer Topics	Basic Science	Pathology	Medicine	Obstetrics/ Gynecology	Pediatrics	Radiology	Surgery
Basic science	54	47	34	42	36	28	29
Diagnosis	30	41	38	59	36	58	42
Multidisciplinary management	47	58	62	64	86	75	60
Psychosocial aspects	32	35	48	53	74	42	34
Chemotherapy	33	23	33	26	28	32	26
Radiation therapy	23	16	32	27	22	56	24
Surgical therapy	18	11	20	18	16	20	29

STUDENT RESPONSES

The responses to several of the questions in the student questionnaire are relevant to cancer education activities in clerkships, electives, and other curricular responsibilities of departments of medicine (7). Diagnostic procedures to which students are traditionally exposed during medicine clerkships include proctosigmoidoscopy, bone marrow aspiration and biopsy, and the physical examination. Of the 1,757 fourth-year students responding to the questionnaire, 47 percent stated they had not performed a proctosigmoidoscopy, and 54 percent stated they had not performed bone marrow aspiration or biopsy.

Fifty-eight percent of these clinical respondents stated they had less than 10 hours of cancer instruction during their medicine clerkships, as compared with 57 percent for surgery clerkships, 66 percent for obstetrics/gynecology clerkships, and 85 percent for pediatrics clerkships. The percentages of respondents having seen either no patients or six or more patients with specified cancers during all previous medical school experiences are listed in Table 2. The incidence of various types of cancer in the United States is also indicated. It is not to be inferred that the quality of cancer teaching can be assessed primarily from the number of patients seen. However, the figures indicate that a majority of students are being exposed to relatively few patients with common neoplasms. The representative responses in Table 2 indicate that approximately one-quarter of medical students may not have an opportunity to see patients with such relatively common cancers as those of the prostate, head and neck, pancreas, ovary, and central nervous system. Forty-one percent had seen no patients with malignant melanoma. Conversely, the survey data suggest that lymphomas and leukemias, diseases traditionally managed primarily by departments of medicine and pediatrics, received a disproportionately larger amount of teaching time, and students received more exposure to these

TABLE 2

Percentage Distribution of 1,757 Responding Clinical Students (1978) According to the Number of Specific Cancer Patients Seen During Previous Medical School Experience and the Incidence of Each Type of Cancer in the United States (1983)

Type of Cancer	Percentage of Students Seeing Patients		New Cases*
	None	Six or More	
Lung	5	41	135,000
Colorectal	8	26	126,000
Breast	9	33	114,900
Prostatic	21	13	75,000
Head and neck	27	13	38,100
Lymphoma	17	14	30,700
Pancreatic	31	4	25,000
Leukemia	14	25	23,900
Ovarian	29	8	18,200
Malignant melanoma	41	3	17,400
Central nervous system malignancies	28	10	12,600

* Estimated new cases in the United States, 1983 (8).

patients in relation to diseases of high incidence.

These results may reflect the degree to which patients with certain low-incidence diseases, such as leukemia, are hospitalized, while patients with higher-incidence malignancies, such as colorectal or breast carcinoma, are more likely to be diagnosed and managed primarily as outpatients unless they have major complications. From the survey results, the difficulties in involving students in cancer outpatient management were apparent. These difficulties are usually associated with time and financial pressures arising from large numbers of patients relative to numbers of faculty physicians, with patient acceptance of student involvement, and with scheduling difficulties. Few schools among the 44 visited had developed satisfactory methods for exposing students to cancer outpatients. Seventy-two percent of all student respondents, when asked their opinions about certain possible changes in their curriculum, stated they agreed with the statement that "students should be required to follow at least one cancer outpatient for several visits."

Concerning other curriculum changes, fourth-year students indicated they felt more time should be devoted to multidisciplinary patient management (50 percent), psychosocial issues (49 percent), diagnostic procedures (44 percent), radiation therapy (34 percent), and chemotherapy (32 percent). Percentages for preclinical students were similar, although slightly higher for diagnostic procedures (48 percent) and slightly lower for therapy (26 percent). Over one-fourth of the student respondents had had no personal patient experience involving radiation therapy. Eighty-four percent of the fourth-year students felt that a cancer curriculum should be required for all medical students.

Cancer Education Objectives

As a logical extension of the Cancer Education Survey, with its data on the strengths and deficiencies of cancer education activities in professional schools, a second contract was awarded to the AACE in 1980 by the National Cancer Institute. Again one of the authors (RFB) served as principal investigator, and the other served as chairman of the Medical Oncology Education Committee, which developed a set of cancer education objectives for departments of medicine.

The overall purpose of this project, Evaluation of the Effectiveness of Cancer Education, was to develop a methodology for providing systematic evaluation of the effectiveness of NCI Clinical Cancer Education Program grants. Since effective evaluation presupposes the availability of defined objectives, this project involved the development of a set of cancer education objectives for each major department in medical and dental schools by working committees of the AACE.

The project was completed in 1981, and the objectives were published in that year (2). They provide a definition of the aims of an optimal cancer education program for professional schools. Since clinical teaching is customarily planned, conducted, and evaluated by departments, the objectives were arranged according to academic clinical departments. The basic science objectives were grouped together because of the variability in cancer teaching and research interests among basic science departments. It was recognized that the listing of objectives by department might work against the concept of the importance of interdisciplinary and interdepartmental teaching in cancer education. In order to take that crucial step, the relating of departmentally oriented objectives to interdepartmental coordination of teaching, an approach which adapts the objectives to the multidisciplinary teaching of cancer medicine was developed by the authors.

Departmental Responsibilities

As an arbitrarily chosen example, lung cancer is used here by the authors to illustrate departmental responsibilities for teaching medical students. A given educational objective is assigned to those departments which might reasonably be expected to have responsibility for that teaching objective. Eight departments are considered: basic science departments (collectively), pathology, medicine, surgery, radiation therapy, diagnostic radiology, psychiatry, and preventive medicine. For each educational objective (for example, etiology, diagnosis, surgery, and irradiation), one department is assigned primary teaching responsibility and others secondary responsibility. The exact assignments, which may vary depending on circumstances, such as the distribution of faculty resources in a given medical school, are less important than the concept that teaching responsibilities should be identified clearly as the first step in developing interdepartmental coordination.

Faculty members in the department of preventive medicine are assigned primary responsibility, for example, for teaching students an educational objective concerning the epidemiology and etiology of lung cancer. In planning this aspect of the curriculum, the preventive medicine faculty has as collaborators faculty members from the basic sciences and the departments of pathology, medicine, and psychiatry (those departments with secondary responsibility for this objective). In contrast, the department of medicine is assigned the primary role for teaching a diagnostic objective concerning clinical presentations, with supportive teaching being provided by the departments of surgery, radiation therapy, and diagnostic radiology.*

In this multidisciplinary approach, the department with the primary responsibility takes the lead in bringing the other designated departments together to develop the curriculum with respect to a given objective. All the objectives for a given tumor site must then be coordinated, either by the department of medicine or by an interdisciplinary cancer education committee. Similar examples denoting areas of teaching responsibility should be constructed for each objective after interdepartmental discussions. The details may be modified, as appropriate, to suit the circumstances of a given school or of a particular teaching philosophy. Designating specific departments to assume primary and secondary roles is less important than it is to define teaching responsibilities in relation to specific educational objectives in the development of a given curriculum. A matrix presentation showing assignment of teaching objectives to departments seems an effective, graphic way of implementing the approach described here concerning the education of medical students in oncology. This approach can address the criticism brought out in the Cancer Education Survey that there is too little interdepartmental coordination of teaching. It can be adapted to accommodate the views of a given medical school, and it also can be applied to non-oncological teaching. For example, the teaching of cardiovascular disease might be coordinated through a similar mechanism, involving designated responsibilities for basic sciences (anatomy, physiology, nutrition), pathology, medicine, surgery, diagnostic radiology, and preventive medicine.

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* A representative list of objectives and suggested assignments may be obtained from the authors.

Discussion

The results of the survey of cancer education in U.S. medical schools indicate a variety of strengths which departments of medicine contribute to interdepartmental cancer education programs for medical students. Faculty members from a variety of medical subspecialties were considered to be cancer education teachers. Faculty members from departments of medicine had assumed educational leadership roles in over half of the medical schools in the subgroup where a cancer education coordinator was identified by departmental affiliation. This degree of major faculty involvement suggests the possibility of departments of medicine making key contributions to the correction of some of the deficiencies revealed by the survey data.

The degree of primary involvement of departments of medicine with such common malignancies as lung and breast cancer, as well as gastrointestinal and hematologic malignancies and management of advanced cancer in general, indicates that deficiencies may result if less than optimal emphasis is given to cancer teaching in departments of medicine during the clerkships. The data in Table 2 suggest that departments of medicine may overemphasize leukemia and lymphoma as examples of neoplasia to the exclusion of teaching activities involving more common malignancies; approximately the same percentage of students during medical school are exposed to leukemia, a relatively uncommon malignancy, as to colorectal and breast carcinomas, two of the more common tumors. The need to involve students in outpatient oncology experiences should be inferred from that observation. Such experiences are important in at least two contexts. First, there is a need for virtually all physicians to be familiar with fundamentals of preventive oncology, including risk factors, early symptoms and signs of common cancers, and indications for appropriate diagnostic procedures. Education in this area would be facilitated by multidepartmental programs of outpatient exposure to patients with localized, early cancer of the colon, rectum, breast, prostate, head and neck, uterus, ovary, and melanoma. Second, outpatient oncology activities would allow students to see more long-term survivors of cancer. Medical oncology, radiation oncology, and surgery follow-up clinics could well provide such longitudinal experiences, during which students would learn about multidisciplinary patient management, nutritional support, pain control, psychosocial support, and rehabilitation. Appropriate interdepartmental coordination would permit the utilization of a variety of departmental outpatient clinics as well as cancer screening facilities.

Medicine clerkships are appropriate sites for teaching medical students the cancer-related procedures of proctosigmoidoscopy and bone marrow aspiration/biopsy, which about half of the fourth-year student respondents stated they had not performed. A systematic program assuring that every medical student would achieve a rudimentary level of skill in these and other important diagnostic procedures, such as indirect laryngoscopy, should be incorporated into either medicine and surgery clerkships or outpatient experiences to assure appropriate competence among all residents.

Obviously medical schools and their departments of medicine are responsible for instruction in many diseases other than cancer. The matrix approach described here, relating departmental responsibilities to educational objectives, could be adapted to a variety of teaching programs. The degree to which the idealized list of cancer education objectives (2) can be approached will depend on the availability of faculty members who feel comfortable teaching about common neoplastic diseases and on the availability of patients with common malignancies. However, with appropriate interdisciplinary curricular planning and cooperation, all medical schools should be able to provide an adequate basal experience in cancer education for all students. A cancer education committee consisting of representatives from all basic science and clinical departments involved in cancer-related activities as well as nursing and student representatives might well be the key to interdepartmental coordination. Regular meetings of such a committee, with recommendations transmitted to the dean, curriculum committee of the school, and individual department chairmen and members, should facilitate improved utilization of available faculty members and patients in an effective approach toward the educational objectives. Departments of medicine should participate enthusiastically in this coordinating function and provide appropriate leadership and initiative.

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DATAGRAM

Net Patient Revenue at University-Owned Teaching Hospitals, 1981

The Department of Teaching Hospitals of the Association of American Medical Colleges (AAMC) has conducted its 12th annual survey of financial and general operating data for the university-owned members of the AAMC's Council of Teaching Hospitals (COTH). Sixty-five hospitals were asked in April 1982 for information on their fiscal year 1981 operations. By November 1982, all but one had submitted completed questionnaires, yielding a 98 percent response rate. The fiscal 1981 questionnaire was keyed generally to references in the Medicare Cost Report Form HCFA-2552. All questions that appeared in the previous year's survey were again asked. The operating income data are reported on an accrual basis.

State Appropriations

Approximately two-thirds of all of the survey respondents reported receiving some state appropriations in fiscal 1981. In many cases, the state appropriations functioned as a third-party payer and provided the necessary funds, at least in part, to support the provision of services to partial pay or indigent patients who would otherwise be unable to afford such services on their own. State funds apparently were also utilized to subsidize clinical teaching and other educational activities at a number of the responding hospitals. However, while these were labeled as teaching support funds, it is not possible to distinguish in the strictest sense between the patient care and educational uses of these appropriations. The problem of making the distinction is compounded by the fact that some hospitals contracting with the state provided specific types of services to certain groups of patients (for example, those receiving radiation therapy or psychiatric care) and did not always refer to funding for such services as state appropriations.

Table 1 tracks the percentage of the hospitals that received state appropriations by the proportion of their total operating revenues from such appropriations between fiscal 1975 and fiscal 1981. A total of 43 (or 67 percent) of the 64 responding hospitals indicated receipt of some state appropriations in fiscal 1981. Forty of the 43 institutions with state funds were publicly owned hospitals. In each year between fiscal 1975 and fiscal 1981, more than three-fourths of the hospitals reporting state appropriations indicated that these funds accounted for 30 percent or less of their total operating revenue. At only four of the 43 state-funded hospitals did such appropriations account for more than 30 percent in fiscal 1981. And, at only seven of the 43 hospitals did state funds provide the leading source of operating revenue.

For purposes of comparing the dollar amounts of state appropriations made in fiscal 1980 and fiscal 1981, state funds at one hospital were excluded from the data to avoid bias. This hospital was in its first year of operation in fiscal 1981 and relied extensively on state funding. The remaining 42 hospitals received $555 million in state funds in fiscal 1981 compared with $504 million in fiscal 1980. Therefore, the average increase in state appropriations across these 42 institutions was approximately $1.2 million per hospital between the two fiscal years. In absolute dollar amounts, individual state appropriations in fiscal 1981 ranged from a low of $302,159 to a high of $62.5 million.

Net Patient Revenue by Source

In the fiscal 1980 survey, participants were asked specifically to provide information on their net patient revenue by source. Net patient revenue is equivalent to gross patient revenue (based on full established rates) minus contractual adjustments, bad debts, and charity and other deductions. It was felt that the ability to differentiate net payments from gross charges by source would greatly enhance the meaningfulness of the data for comparative purposes. Thirty-nine (61 percent) of the fiscal

TABLE 1

Distribution of University-Owned Teaching Hospitals That Received State Appropriations by Proportion of Their Operating Revenue from Such Appropriations, 1975 Through 1981

Fiscal Year	Percentage Total Operating Revenue from State Appropriations					
	1–10 Percent	11–20 Percent	21–30 Percent	31–40 Percent	41–50 Percent	51–100 Percent
1981 ($n = 43$)	13	15	11	1	2	1
1980 ($n = 44$)	16	12	8	4	4	0
1979 ($n = 43$)	16	9	11	2	4	1
1978 ($n = 41$)	12	13	11	2	3	0
1977 ($n = 41$)	15	10	7	6	2	1
1976 ($n = 40$)	15	9	7	6	3	0
1975 ($n = 38$)	8	11	9	4	5	1

TABLE 2

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Received State Appropriations Earmarked for Patient Care, Fiscal 1980 and 1981
(In thousands of dollars)

Revenue Source	Fiscal 1981* ($n = 18$)		Fiscal 1980* ($n = 18$)	
	Amount	Percent	Amount	Percent
State appropriations†	228,266	17.7	203,347	18.2
Blue Cross	177,602	13.8	149,249	13.3
Commercial insurance	197,609	15.3	197,449	17.6
Self-pay	75,565	5.9	83,125	7.4
Medicare	325,039	25.2	261,596	23.4
Medicaid	189,836	14.7	145,884	13.0
County appropriations	15,919	1.2	15,657	1.4
City appropriations	0	0	0	0
Additional welfare payments	26,169	2.0	24,878	2.2
Workman's compensation	5,364	0.4	3,858	0.3
Other	46,680	3.6	34,436	3.1
Total	1,288,049	100.0	1,119,480	100.0

* Percentage and dollar amounts may not total due to rounding.

† May include funds for nonpatient care uses.

1981 survey respondents were able to report net patient revenue by source. However, only 29 of these same institutions reported in this way in fiscal year 1980. Therefore, for comparison purposes, tables 2–4 are based on the net patient revenue data from these 29 hospitals or some subset of them, depending on the particular variables being examined.

State appropriations were received by 18 of the 29 hospitals in both fiscal 1980 and fiscal 1981. Table 2 presents net patient revenue data at these 18 hospitals by source for these years. In both years, state appropriations were the second leading source of net patient revenue behind Medicare payments. Medicare revenue, as a percentage of aggregate total net patient revenue, continued to rise in fiscal 1981 (as it had over the past several survey years), while the portion from state appropriations dropped slightly (by 0.5 percentage point). Commercial insurance was the third leading source of net patient revenue among the hospitals that received state appropriations in each fiscal year, but dropped considerably (by 2.3 percentage points) in its portion of aggregate total net patient revenue between fiscal 1980 and fiscal 1981. Medicaid was next highest in fiscal 1981 at 14.7 percent, a 1.7 percentage point increase over the fiscal 1980 figure. The average total net patient revenue

TABLE 3

Sources of Net Patient Revenue for University-Owned Teaching Hospitals That Did Not Receive State Appropriations Earmarked for Patient Care, Fiscal 1980 and 1981

(In thousands of dollars)

Revenue Source	Fiscal 1981* (*n* = 9)		Fiscal 1980* (*n* = 9)	
	Amount	Percent	Amount	Percent
Blue Cross	180,442	26.5	162,891	27.4
Commercial insurance	121,079	17.8	115,447	19.4
Self-pay	55,888	8.2	37,035	7.9
Medicare	199,135	29.3	176,853	29.7
Medicaid	46,289	6.8	37,212	6.3
County appropriations	587	0.1	510	0.1
City appropriations	0	0	0	0
Additional welfare payments	5,692	0.8	6,778	1.1
Workman's compensation	1,672	0.2	1,759	0.3
Other	69,564	10.2	46,466	7.8
Total	680,349	100.0	594,951	100.0

* Percentages and dollar amounts may not total due to rounding.

TABLE 4

Sources of Net Patient Revenue by Type of Care in University-Owned Teaching Hospitals, Fiscal 1980 and 1981*

(In thousands of dollars)

Revenue Source	Fiscal 1981 (*n* = 28)†				Fiscal 1980 (*n* = 28)†			
	Outpatient		Inpatient		Outpatient		Inpatient	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Blue Cross	38,520	15.2	356,155	20.4	29,713	13.5	313,662	21.0
Commercial insurance	38,102	15.0	295,048	16.9	32,580	14.8	294,361	19.7
Self-pay	44,583	17.6	96,376	5.5	48,758	22.1	98,135	6.6
Medicare	50,152	19.7	506,307	29.0	39,440	17.9	430,023	28.7
Medicaid	33,556	13.2	235,322	13.5	30,054	13.6	180,563	12.1
State appropriations‡	22,922	9.0	109,530	6.3	19,619	8.9	68,047	4.5
County appropriations	4,696	1.9	11,810	0.7	4,315	2.0	11,852	0.8
City appropriations	0	0	0	0	0	0	0	0
Additional welfare payments	4,216	1.7	27,645	1.6	4,528	2.1	27,029	1.8
Workman's compensation	893	0.4	6,119	0.4	804	0.4	4,780	0.3
Other	16,368	6.4	97,375	5.6	10,459	4.7	68,169	4.6
Total	254,008	100.0	1,741,687	100.0	220,270	100.0	1,496,621	100.0

* Data reported only for those hospitals able to separate net patient revenue into inpatient and outpatient categories.

† Percentages and dollar amounts may not total due to rounding.

‡ Includes only funds reported as net patient revenue.

at the 18 state-funded hospitals grew from $62.2 million in fiscal 1980 to $71.6 million in fiscal 1981, a 15.0 percent increase.

As shown in Table 3, nine of the hospitals able to report net patient revenue by source in both fiscal 1980 and fiscal 1981 indicated receipt of no state appropriations in either year. Among these institutions, Medicare, Blue

Cross, and commercial insurance were the three leading sources of net patient revenue in descending order in each year, accounting for approximately three-fourths of total net patient revenue in the aggregate. Medicaid in fiscal 1981 contributed only 6.8 percent of total net patient revenue, or about half its percentage contribution to the hospitals that received state funds. The average total net patient revenue at the nine non-state-funded hospitals rose from $66.1 million in fiscal 1980 to $75.6 million in fiscal 1981, a 14.4 percent increase.

Net Patient Revenue by Type of Care

Twenty-eight of the hospitals able to report net patient revenue by source in both fiscal 1980 and fiscal 1981 were able to separate this revenue into inpatient and outpatient categories in each fiscal year. Table 4 lists these data. On the inpatient side, Medicare was the leading source of net patient revenue in each year, followed by Blue Cross and commercial insurance (which fell 2.8 percentage points in its portion of aggregate total net inpatient revenue at the 28 hospitals between the two years). Although the proportion of net inpatient revenues from state appropriations increased between fiscal 1980 and fiscal 1981, it still accounted for only 6.3 percent of the aggregate total net inpatient revenues for the 28 hospitals in fiscal 1981. The average total net inpatient revenue per hospital rose from $53.5 million in fiscal 1980 to $62.2 million in fiscal 1981, a 16.3 percent increase.

On the outpatient side, the leading sources of net patient revenue differed between the two years among the 28 hospitals able to report such revenue by type of care. In fiscal 1980, self-pay patients were the leading source of net outpatient revenue, followed by Medicare and commercial insurance. In fiscal 1981, Medicare became the leading source of net outpatient revenue for these hospitals, followed by self-pay patients and Blue Cross (which was closely followed by commercial insurance). It is difficult to ascertain the meaningfulness of this year-to-year variation due to the tendency of several respondents to report combined totals for revenue from Blue Cross, commercial insurance, and/or self-pay patients rather than separately identifying amounts for each source. On average, the total net outpatient revenue at the 28 hospitals increased from $7.9 million in fiscal 1980 to $9.1 million in fiscal 1981, a 15.2 percent increase.

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Volume 59 • Number 2 • February 1984

AAMC Annual Meeting

Transformation of Medicine Since 1945—Julius R. Krevans 75

Managing the Revolution in Medical Care—Robert G. Petersdorf 79

Infuriating Tensions: Science and the Medical Student—J. Michael Bishop 91

Flexner and Research Awards 103

A Tracking Study of 1977 Medical Graduates Through Graduate Medical Education in Ontario—A. I. Rothman 107

A Comparison of Two Methods of Introducing Medical Students to Pediatric Clinical Evaluation—Olle Jane Z. Sahler, Margaret T. Colgan, and Robert A. Hoekelman 112

Mood Changes During the Internship—Regina L. Uliana, F. Allan Hubbell, Frederic A. Wyle, and Geoffrey H. Gordon 118

A Comparison of Students' Clinical Experience in Family Medicine and Traditional Clerkships—George R. Parkerson, Jr., Lawrence H. Muhlbaier, and Judith C. Falcone 124

Communications: Structure and Function of Medical School Admissions Committees—David M. Arnold, Rodney M. Coe, and Max Pepper 131

Performance-Based Evaluation of Medical Students' Interviewing Skills—Emily Mumford, Donna Anderson, Timothy Cuerdon, and James Scully 133

Clerkship Rounds Involving Senior Citizens at a High-Rise Apartment Complex—G. E. Cotton 135

A Social-Discussion Group for First-Year Residents—Paul S. Weiner 137

Introducing Nutrition Education in a Family Practice Residency—Warren Rubenstein and Frances Berkoff 139

Editorial: The Use of Faculty Time 141

Datagram: Trends in Teaching Hospital Construction Funding, 1969–1981 143

Bibliography 148

Letters to the Editor 154

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A Tracking Study of 1977 Medical Graduates Through Graduate Medical Education in Ontario

A. I. Rothman, Ed.D.

Abstract—In this paper, the author describes the results of tracking a cohort of medical school graduates through the graduate medical education system of Ontario, Canada. The cohort consisted of the 1977 graduates of the five Ontario medical schools who entered the graduate system at some point between 1977 and 1982 and graduate trainees who had graduated in 1977 from medical schools outside Ontario. The objectives of the study were to determine what proportion of the total number of 1977 Ontario medical graduates received graduate training in Ontario; to document the flow of the trainees into and out of the Ontario graduate system; and to compare the graduate training patterns of the Ontario graduates in the cohort with the trainees from elsewhere.

Physician manpower planning has been one response to the growing problem of providing high quality health services at levels of financial costs acceptable to society. Activity in this area at the national level has occurred in both Canada (1, 2) and the United States (3–5). In Canada, where provinces bear the primary responsibilities for the delivery of health care and the education of medical professionals, the capacity to plan effectively has been sought by several of the provinces. At present this capacity is highly developed in Ontario (6) and has involved the Province of Ontario Ministry of Health and the Council of Ontario Faculties of Medicine. At all levels, planning has required accurate data describing the active physician complement and the output of medical schools and graduate training programs. In addition, there has been the need at the provincial level for data describing the rates of provincial medical manpower immigration and emigration.

In Ontario, data describing the output of the medical undergraduate programs of the five provincial medical schools (McMaster University, University of Ottawa, Queen's University, University of Toronto, and the University of Western Ontario) have been easy to obtain. In addition, an accurate registry of active medical manpower in Ontario is published annually by the Ontario Physician Manpower Data Centre in Toronto. The planning process, however, requires an understanding of the relationship between the production and the subsequent distribution of medical manpower in the province. Tracking studies of the output of the provincial undergraduate and graduate training programs are needed to help in reaching this understanding.

The work described here was funded by the Ontario Ministry of Health and was done with the assistance of the staff of the Ontario Physician Manpower Data Centre, Toronto.

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The purpose of the study reported here was to contribute to the process of medical manpower planning in Ontario by tracking a cohort of graduate trainees through the Ontario graduate system. The cohort consisted of graduate trainees in the Ontario system who were graduated from an undergraduate medical program either in Ontario or elsewhere in 1977.

The specific goals of this study were (*a*) to determine what proportion of the total number of 1977 Ontario medical graduates received graduate training in the Ontario system; (*b*) to document the flow of trainees in the cohort from Ontario or elsewhere into and out of the Ontario graduate system; and (*c*) to compare the graduate training patterns of the Ontario graduates with the trainees from elsewhere.

In this paper, the data generally are provided by broad categorizations, but more detailed representations were used in the report prepared for the Ontario Ministry of Health.

The Data

The data for this study were obtained from the postgraduate registry of the Ontario Physician Manpower Data Centre. The registry is derived from online computer systems that link the graduate offices of the five Ontario medical schools with the data centre. The centrally stored data are continually updated and reflect the current graduate registrations at each of the training centres. For the purposes of this study, graduate registration data were frozen at the end of June 1982 for all members of the cohort. The use of the data centre facilities and the data were approved by the data centre's management committee, which includes representatives of the Ontario Ministry of Health, the Council of Ontario Faculties of Medicine, and the College of Physicians and Surgeons of Ontario.

The Cohort

A total of 570 students were graduated from the five Ontario medical schools in the spring of 1977. Of these, 408 (72 percent) entered the Ontario graduate system at some point in their graduate training and constituted one part of the study cohort. The second part of the cohort consisted of 275 medical school graduates from elsewhere who also had graduated in 1977 and had entered the Ontario graduate system. In this group, 191 trainees were Canadian citizens or landed immigrants (immigrants with legal status in Canada and who intend to become Canadian citizens) who had received their M.D. degrees outside Ontario, and 84 were non-Canadians with employment visas or other kinds of visas.

Percentages rather than numbers of trainees are presented in the tables in this paper. In the tables relating to the Ontario graduates (tables 1 and 2), the percentages have been defined with reference to the total number of Ontario graduates in the cohort (408). In tables relating to the trainees from elsewhere, the percentages have been defined with reference to the number of non-Ontario trainees referred to in the respective tables (Table 3 describes all non-Ontario trainees in the cohort [275]; Table 4, the non-Ontario Canadians [191]; and Table 5, non-Canadian visa trainees [84]).

Results and Discussion

The data in Table 1 indicate the movement of Ontario graduates in the cohort into and out of the Ontario postgraduate system in the five-year interval July 1, 1977, to June 30, 1982. For example, in the 1978–79 academic year, 74 percent of the 408 Ontario graduates in the cohort were enrolled in the system, 4 percent were yet to enroll, 5 percent had left the system but would enroll again, and 17

TABLE 1

Percentage of 1977 Ontario Medical School Graduates (n = 408) in the Ontario Graduate System, 1977–78 to 1981–82

Postgraduate Year	Enrolled in System	Enrolled Later	Left But Re-enrolled Later	Left Permanently (Cumulative)*
1977–78	91	9	—	—
1978–79	74	4	5	17
1979–80	51	2	5	42
1980–81	44	1	2	53
1981–82	37	—	—	63

* For example, 17 percent left the system at the end of 1977–78, and 25 percent left the system at the end of 1978–79, giving a total of 42 percent who had left the system by the end of 1978–79 (or the beginning of 1979–80).

TABLE 2

Percentage of 1977 Ontario Medical School Graduates (n = 408) Enrolled in the Ontario Graduate System, by Program Area

Postgraduate Year	Straight Internship	Rotating/ Mixed Internship	Family Medicine	Surgery	Medicine	Other
1977–78	59	32	—	—	—	—
1978–79	—	—	25	10	17	22
1979–80	—	—	5	10	15	21
1980–81	—	—	1	11	11	21
1981–82	—	—	1	10	9	17

percent had left the system and would not return. Table 2 presents the distribution of the Ontario graduates in the system in two training categories in the internship year and in the years following within four broad training categories: family medicine; surgery, including the surgical subspecialties; internal medicine, including the medical subspecialties; and others, such as obstetrics/gynecology, psychiatry, pediatrics, otolaryngology. Tables 3, 4, and 5 describe in similar ways the flow and distributions within program categories of the non-Ontario trainees.

In the first two tables the progression of the 1977 Ontario medical school graduates through the graduate system can be traced. Twenty-two percent of the Ontario graduates left the system immediately after the internship year. Twenty-five percent participated in the two-year family practice program, and most of these trainees left at the end of the second graduate year. In the fifth year, 37 percent were still participating in specialty training in Ontario. At the end of the fifth year, 95 percent of these trainees had left the Ontario system (not shown in tables).

In contrast, the data in tables 3, 4, and 5 suggest that generally the non-Ontario trainees had training goals that were substantially different from those of their Ontario graduate colleagues. It appears that the non-Ontario trainees were more interested in advanced level training, since proportionately fewer selected training in family medicine. Differences between the enrollment patterns of the two parts of the cohort over the five-year interval of the study were one consequence of the different training goals. As time progressed, enrollment of the non-Ontario trainees in the graduate system increased while the enrollment of the Ontario graduates decreased.

The data in tables 4 and 5 indicate that there were significant differences between the training paths of the Canadian and

TABLE 3

Percentage of 1977 Non-Ontario Medical School Graduates (*n* = 275) in the Ontario Graduate System

Postgraduate Year	Enrolled in System	Enrolled Later	Left Permanently (Cumulative)*
1977–78	38	62	—
1978–79	42	46	12
1979–80	37	38	25
1980–81	49	21	30
1981–82	55	—	45

* For explanation, see footnote to Table 1.

TABLE 4

Percentage of 1977 Non-Ontario Medical School Graduates (*n* = 191) Who Were Canadians or Landed Immigrants in the Ontario Graduate System, by Program Area

Postgraduate Year	Enrolled Later	Enrolled						Left Permanently (Cumulative)*
		Straight Internship	Rotating/ Mixed Internship	Family Medicine	Surgery	Medicine	Other	
1977–78	52	21	27	—	—	—	—	—
1978–79	36	—	—	12	6	10	22	14
1979–80	29	—	—	5	5	7	24	30
1980–81	17	—	—	3	5	9	31	35
1981–82	—	—	—	2	7	8	35	48

* For explanation, see footnote to Table 1.

TABLE 5

Percentage of 1977 Non-Ontario Medical School Graduates with Visas (*n* = 84) in the Ontario Graduate System, by Program Area

Postgraduate Year	Enrolled Later	Enrolled						Left Permanently (Cumulative)*
		Straight Internship	Rotating/ Mixed Internship	Family Medicine	Surgery	Medicine	Other	
1977–78	85	13	2	—	—	—	—	—
1978–79	70	—	—	1	4	5	13	7
1979–80	58	—	—	—	4	8	16	14
1980–81	31	—	—	—	9	13	29	18
1981–82	—	—	—	1	18	8	34	39

* For explanation, see footnote to Table 1.

visa sections of the non-Ontario part of the cohort. For example, the non-Ontario Canadians tended to enter the Ontario system sooner and to leave sooner; and a significant proportion of these Canadian trainees (12 percent) participated in the family practice residency program.

On leaving the Ontario graduate system after one or two years of training, twice as many Ontario graduates stayed in Ontario as went elsewhere. This trend was less pronounced among trainees who departed in the next two years and, in fact, was reversed among those who left the graduate system after the fifth year. That is, Ontario graduates who left the system and stayed in Ontario tended to enter general or family practice. By contrast, this trend was modified and then reversed for Ontario graduates who left in subsequent years to enter specialty practice or to take further subspecialty training.

In the interval of the study reported here, a significant proportion (18 percent) of the non-Ontario Canadian trainees remained in the province on leaving the Ontario graduate system. It is probable that more than half of these trainees entered general or family practice.

Of the visa trainees who left the graduate system in the interval of this study, only a few (10 percent of this part of the cohort) remained in Ontario. A majority of the visa trainees (61 percent) were still in the graduate system at the end of the 1980–81 academic year.

Conclusions

In this study, a cohort of graduate trainees was tracked through the Ontario graduate medical education system. The cohort included the 408 graduates of the Ontario medical schools who had been graduated in the spring of 1977 and who had entered the Ontario graduate system at some point in the next five years, the term of this study. In addition, the cohort also included 275 trainees who had graduated from medical schools outside Ontario in the spring of 1977. In this group, 191 of the trainees were non-Ontario Canadians or landed immigrants, and 84 were non-Canadians holding visas.

A total of 570 students graduated from the medical schools of Ontario in the spring of 1977, and 408 of these students entered the Ontario graduate system at some point in the next five years. The results of this study indicated that there were relatively well-defined differences between the trainee groups in the cohort with reference to: the training programs followed, points of entry into the system, duration of training, points of exit, and the relative number of trainees staying or leaving Ontario at the completion of their training.

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DATAGRAM

Trends in Teaching Hospital Construction Funding, 1969–1981

Periodically since 1968, the Association of American Medical Colleges (AAMC) has published analyses of the sources of construction funding of the nonfederal members of its Council of Teaching Hospitals (COTH) and of all nonfederal, nonprofit hospitals nationwide. The data for these analyses were extrapolated from the American Hospital Association's (AHA) Survey on the Sources of Funding for Hospital Construction for the years 1969, 1974, and 1979. The current discussion will contrast the data from these previous years with selected results from the AHA survey for 1981. The survey is sent to all hospitals nationwide, and responses are received from hospitals that began construction projects in the survey year.

Table 1 and Figure 1 display the trends in total construction funding by source for COTH nonfederal members in each of the four survey years studied. Table 2 presents data on an average-per-institution basis. All of the 1969 amounts relate to total funds for construction projects completed that year. For 1974, 1979, and 1981, the data reflect total funds for construction projects started in those years. Table 3 shows the percentages of construction funds by source at both COTH nonfederal members and all nonfederal, nonprofit, short-term hospitals (including the COTH hospitals) in 1981. For the analysis, these hospitals are differentiated by ownership—state and local government versus nongovernment, voluntary nonprofit. Long-term, investor-owned, and federal hospitals are excluded from the data.

COTH Hospitals

As shown in Table 1, $284 million was expended on capital construction in 1969 by 126 COTH-member institutions. At that time, funding from hospital internal operations (that is, accumulated earnings) and state and local grants and appropriations provided 51 percent of the construction capital. In 1981, these combined sources provided only 21 percent of total construction funds at the 66 COTH respondents. As philanthropy and government grants for construction projects continued to wane, reliance on debt financing continued to rise. In 1969, only 20 percent of COTH-member construction funding was derived from some form of borrowing. This percentage grew dramatically to 50 percent in 1974, to 68 percent in 1979, and to a new high of 74 percent in 1981. Thus, nearly three-quarters, or $653.2 million, of total construction funds at COTH hospitals in 1981 was financed through debt. About 87 percent of this amount was acquired through the issuance of state and local tax-exempt bonds (that is, the interest is exempted from federal, state, and local income taxes), which have become the largest single source of construction funds at both COTH and other nonprofit hospitals nationwide. Twenty-five states now have state authorities to sell hospital tax-exempt bonds, and 34 states have legislation enabling other governmental units to issue such bonds.

A total of $879 million in funds for construction projects started in 1981 were reported by the 66 COTH institutions. When adjusted for inflation in construction costs, this figure is equivalent to $308 million in 1969 constant dollars. Because the COTH sample size differed substantially in the 1969 and 1981 survey years (126 versus 66 hospitals), comparisons were made based on the average inflation adjusted dollars expended per institution in these years, as well as 1974 and 1979. As shown in Table 2, the 1981 average ($4.67 million) was 107 percent higher than the 1969 average ($2.25 million) and 81 percent higher than in 1979 ($2.58 million). However, the 1974 inflation adjusted dollar average ($5.14 million) expended per COTH survey institution exceeded the 1981 figure by 10 percent.

Accompanying the tremendous rise in the use by COTH members of debt financing was

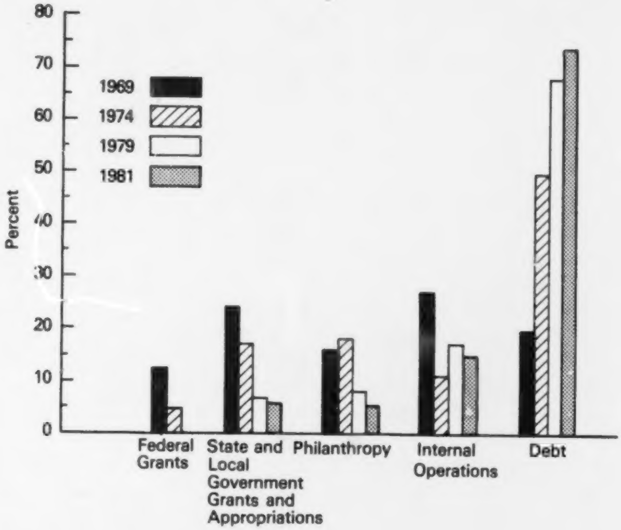

FIGURE 1

Sources of construction funds for COTH nonfederal hospitals, 1969, 1974, 1979, and 1981 (Source: American Hospital Association's Survey of the Sources of Funding for Hospital Construction, 1969, 1974, 1979, 1981).

a steady decline in construction funding from all other sources. When comparing percentages of total funding by source in 1969 and 1981 at COTH hospitals, the contribution from internal operations was nearly halved, state and local grants or appropriations diminished by three-fourths, philanthropy fell by more than two-thirds, and federal construction grants became negligible, dropping from 13 percent to considerably less than 1 percent of total funding. These rates of change in percentages of total funding were similar to, though slightly higher than, the rate of change in inflation-adjusted dollar amounts by source. Debt financing, on the other hand, increased nearly four-fold in 1969 constant dollars between 1969 and 1981 and by slightly less on the basis of percentage of total construction funds.

Comparisons with Other Hospitals

As Table 3 depicts, state and local tax-exempt bonds were the leading source of construction funds in 1981 across all categories of COTH and other nonfederal, nonprofit hospitals. However, among state and local government-owned COTH hospitals, state and local grants and appropriations (40.6 percent of total construction funding) provided nearly as much support as state and local tax-exempt bonds (42.1 percent of total construction funding). Among all state and local government hospitals in 1981, the respective figures for these sources of construction funds was 25.7 percent and 39.4 percent of total funding. The proportion of total construction funds from state and local grants and appropriations at the state and local government owned COTH institutions in 1981 was higher than in 1979 (at 22.9 percent) but lower than in 1974 (at 60.8 percent). The debt at these COTH hospitals was largely (95 percent) in the form of state and local tax-exempt bonds. At all state and local government hospitals nationwide, such bond issues provided only 68.2 percent of total construction funds, while 22.7 percent of the debt financing was acquired through direct loans or federal tax-exempt bonds. State and local government COTH hospitals reported no funds from these last two sources.

The figures for construction funding by

TABLE 1

Funding of Construction Projects in COTH Nonfederal Hospitals, 1969, 1974, 1979, 1981*

Funding Sources	In Current Dollars (millions)				In Constant (1969) Dollars (millions)†				Percentage of Total			
	1969 (*n* = 126)	1974 (*n* = 83)	1979 (*n* = 123)	1981 (*n* = 66)	1969 (*n* = 126)	1974 (*n* = 83)	1979 (*n* = 123)	1981 (*n* = 66)	1969 (*n* = 126)	1974 (*n* = 83)	1979 (*n* = 123)	1981 (*n* = 66)
Federal grants	37	28	<1	<1	37	18	<1	<1	13	4	<1	<1
State and local grants and appropriations	69	109	51	55	69	71	21	19	24	17	7	6
Philanthropy	44	118	60	42	44	77	25	15	16	18	8	5
Internal operations	76	72	131	129	76	47	54	45	27	11	17	15
Debt	58	328	522	653	58	214	217	229	20	50	68	74
Total	284	655	764	879	284	427	317	308	100	100	100	100

* Source: American Hospital Association's Survey of the Sources of Funding for Hospital Construction, 1969, 1974, 1979, 1981. For 1969, the data reported relate to total funds for construction projects completed that year. For 1974, 1979, and 1981, the data reflect expected total funds for construction projects started in those years.

† Source: U.S. Department of Commerce Composite Construction Cost Index (base period 1977 = 100): 1969 = 53.4; 1974 = 81.8; 1979 = 128.8; and 1981 = 152.5.

TABLE 2

Average Construction Funding Per COTH Nonfederal Hospital, 1969, 1974, 1979, 1981*

Funding Sources	Average Funding Per Institution in Current Dollars (millions)				Average Funding Per Institution in Constant (1969) Dollars (millions)†			
	1969 (*n* = 126)	1974 (*n* = 83)	1979 (*n* = 123)	1981 (*n* = 66)	1969 (*n* = 126)	1974 (*n* = 83)	1979 (*n* = 123)	1981 (*n* = 66)
Federal grants	.29	.34	<.01	<.01	.29	.22	<.01	<.01
State and local grants and appropriations	.55	1.31	.41	.83	.55	.86	.17	.29
Philanthropy	.35	1.42	.49	.64	.35	.93	.20	.23
Internal operations	.60	.87	1.06	1.95	.60	.57	.44	.68
Debt	.46	3.95	4.24	9.89	.46	2.58	1.76	3.47
Total	2.25	7.89	6.21	13.32	2.25	5.14	2.58	4.67

* Source: American Hospital Association's Survey of the Sources of Funding for Hospital Construction, 1969, 1974, 1979, 1981. For 1969, the data reported relate to total funds for construction projects completed that year. For 1974, 1979, and 1981, the data reflect expected total funds for construction projects started in those years.

† Source: U.S. Department of Commerce Composite Construction Cost Index (base period 1977 = 100): 1969 = 53.4; 1974 = 81.8; 1979 = 128.8; and 1981 = 152.5.

TABLE 3

Percentage of Construction Funds for COTH Nonfederal Hospitals and All Nonfederal, Nonprofit Short-Term Hospitals, 1981*

Funding Sources	State and Local Government†		Nongovernment, Nonprofit†		Total Nonfederal, Nonprofit†	
	All Hospitals (*n* = 124)‡	COTH Hospitals (*n* = 16)	All Hospitals (*n* = 333)‡	COTH Hospitals (*n* = 50)	All Hospitals (*n* = 457)‡	COTH Hospitals (*n* = 66)
Government						
Federal grants	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
State and local grants and appropriations	25.7	40.6	0.1	<0.1	3.6	6.3
Philanthropy						
Fund raising	0.6	0	2.7	0.6	2.4	0.5
Other contributions	0.3	0	1.5	3.5	1.3	2.9
Foundation grants	0.7	0	0.6	1.6	0.6	1.3
Total philanthropy	1.6	0	4.8	5.7	4.3	4.7
Internal operations§	14.8	15.2	15.8	14.4	15.7	14.5
Debt						
Direct loans	4.6	0	3.6	3.9	3.8	3.3
Taxable bonds	0	0	3.0	0	2.6	0
Tax-exempt bonds						
State and local	39.4	42.1	65.0	68.7	61.5	64.6
Federal	8.5	0	0.6	0	1.6	0
HUD loan insurance	<0.1	0	0.3	0	0.3	0
Hill-Burton loan guarantee	0	0	0	0	0	0
Other	5.2	2.0	6.7	7.2	6.5	6.5
Total debt	57.7	44.1	79.2	79.8	76.3	74.4
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0

* Source: American Hospital Association's Survey of the Sources of Funding for Hospital Construction, 1981.

† Funding totals for the various categories were: state and local government—$498.8 million for all hospitals and $135.1 million for COTH hospitals; nongovernment, nonprofit—$3,183.7 million for all hospitals and $743.9 million for COTH hospitals; total nonfederal, nonprofit—$3,682.5 million for all hospitals and $879 million for COTH hospitals.

‡ Includes COTH nonfederal hospitals.

§ Accumulated earnings.

source at both COTH and all nongovernment, nonprofit hospitals were similar for 1981. The only minor difference was that approximately 4 percent of total funding at all hospitals was derived from taxable bonds, federal tax-exempt bonds and Department of Housing and Urban Development (HUD) loan insurance. No such construction funds were reported by the COTH nongovernment, nonprofit institutions for 1981. Among all the COTH hospitals surveyed, debt financing provided 74.4 percent of all construction funds in 1981 and involved only state and local tax-exempt bonds, direct loans, and other miscellaneous borrowing. An even higher proportion of total funds (76.3 percent) was attributable to debt among all the nonfederal, nonprofit hospitals in 1981. Among this larger group of institutions, debt funding was also acquired from taxable bonds, federal tax-exempt bonds, and HUD loan insurance.

Although it is not possible to relate the dollars expended to the type of construction undertaken, some generalizations can be made about the average amounts spent in 1981. Among the state and local government owned hospitals, COTH members averaged $8.4 million for construction per institution, while all such hospitals averaged $4.0 million. Among the nongovernment, nonprofit institutions, COTH members averaged $14.9 million compared with $9.6 million for all such hospitals. In the overall nonfederal, nonprofit category, COTH hospitals averaged $13.3 million, while all such hospitals averaged $8.1 million. The higher averages among the COTH institutions may be attributable in large part to their generally larger size. However, bed size data were not available to confirm this.

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Volume 59 • Number 3 • March 1984

Nurturing the Scientific Enterprise—James B. Wyngaarden 155

The Challenge of Governance: The Relationship of the Teaching Hospital to the University—Robert M. Heyssel 162

Perceived Stress in Medical, Law, and Graduate Students—Marilyn Heins, Shirley Nickols Fahey, and Lisa I. Leiden 169

Response of Faculty Members to Medical Students' Personal Problems—James C. Brown and John M. Barnett 180

Tutored Videotape-Instruction in Clinical Decision-Making—Harold C. Sox, Jr., Keith I. Marton, Michael C. Higgins, and David H. Hickam 188

Communications: Use of Anonymous Student Evaluations of Faculty Members in U.S. Medical Schools—Stephen R. Smith and Leslie J. Paulen 196

A Study of Newly Licensed Physicians—Jenifer Ehreth 198

Advanced Cardiac Life-Support Training for Medical Students and House Officers—Judith Tintinalli, Scott Freeman, Susan Kalia, and Barbara Laubscher 200

Increasing Medical Students' Awareness of Psychological Concomitants of Illness—John Misiaszek 203

A Stress Discussion Group for Medical Interns—John L. Ziegler, Nick Kanas, William M. Strull, and Nancy E. Bennet 205

Editorials: Trust and Understanding Between Heads of Medical School and Teaching Hospital: Requisite for Good Management 208

Balancing Independence and Interdependence: Key to Preserving Medical School–Teaching Hospital Tandem 209

Bibliography 211

Letter to the Editor 215

Supplement: AAMC Annual Meeting and Annual Report, 1983 217

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Response of Faculty Members To Medical Students' Personal Problems

James C. Brown, Ph.D., and John M. Barnett, Ph.D.

Abstract—In the study reported here, the authors examined the interpersonal helping behaviors of medical educators. Ninety-six faculty members from 12 randomly selected medical schools completed a detailed questionnaire providing data on the nature and frequency of their interpersonal behaviors with students experiencing personal problems. The faculty members reported spending an average of 48.6 minutes a week discussing personal problems with students. Student problems reported most frequently pertained to financial concerns, emotional health, and interactions with faculty members. Medical educators used various techniques to offer help; the most commonly reported techniques were listening, asking questions to draw the student out, offering support and sympathy, and offering empathy. Most medical faculty members felt positive about their role as "helper" and rated that component of their job as extremely important. The implications of these findings, especially for staffing and personnel policy, are discussed.

The stress of health care education, especially medical school training, has been noted in the literature as a serious issue for students in these fields (1–4). In the medical school setting, for example, a number of factors have been identified as stressors, including didactic and clinical examinations, the amount of information to be learned, the number of hours of work required, the students' preoccupation with success and the consequent fear of failure, and the limited support and positive feedback provided by the faculty (5, 6).

The potential negative impact of such stressors on medical students is a serious matter and one worthy of concern on the part of all those involved in medical education (7, 8). One important aspect of this matter is the support or help available to medical students as they encounter various stressors and attempt to deal with the resultant distress in their personal and professional lives. The potential interpersonal support available from faculty members would seem to be particularly significant. This is true especially in light of student access to faculty members, the degree of interaction between faculty members and students, and the relatively limited availability of formal mental health services. In fact, it is now well documented that individuals are more likely to seek help for personal problems

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from "informal helpers" than from mental health professionals (9, 10).

Consequently, based on the extent of interaction between medical faculty members and students and their common perspective, it would seem likely that the help of faculty members would be requested by students in need, especially if the former are trusted and liked. It has even been suggested by Aspy (11) that such interpersonal helping skills are an important determiner of effective teaching. He writes that "learning is a process which . . . can be enhanced or diminished in effectiveness according to the degree of interpersonal facilitation with which it is carried out."

While there is limited information suggesting that educators in general are called on to help with students' personal problems (12), there appear to be no systematic data as to specific helping behaviors of faculty members in the health care professions. Because of the documented stress factors which are a part of professional health education, it is useful to assess the interpersonal helping behaviors and attitudes of the faculties in such settings. Therefore, the study reported here was designed to determine the extent of involvement by medical faculty members in students' personal problems, the kind of problems involved, specific helping techniques used by faculty members, and the faculty members' attitudes concerning their role as "helper." The present study is one in a series of such efforts to document the nature of interpersonal helping behaviors by medical, dental, and nursing educators.

Method

All data were obtained from a faculty-student interaction inventory developed by the authors and adapted from an earlier inventory reported by Cowen (13). The revised inventory, a 14-item questionnaire,* several items of which had multiple parts, was designed to secure information in the following areas:

1. Time spent per week by faculty members discussing students' personal problems (defined on the questionnaire as "problems that cause moderate to serious concerns or upsets and which can be school or non-school related").
2. The nature of student problems discussed. Faculty respondents were asked to report on a 4-point scale (0 = very infrequent, 3 = very frequent) the frequency with which they encounter 17 problem areas (such as alcohol and drug abuse, financial problems, emotional health concerns, patient-student difficulties, and didactic and clinical academic problems) and to rank-order the three problems with which they had the most difficulty in offering help.
3. Problem-handling strategies. Faculty members rated 15 helping strategies (for example, "give advice," "listen," "suggest alternatives," "refer to someone else") as to how frequently they were employed on the same 4-point frequency scale described above.
4. Feelings experienced by faculty members as a function of their dealing with students' problems. Using the 4-point frequency scale, respondents rated 12 emotional reactions (for example, helpless, pleased, angry, uncomfortable) that they experienced when called on to handle student problems.
5. Perceived importance of dealing with students' problems and self-assessment of helping effectiveness. On a 5-point frequency scale, faculty members rated how important they felt it was to both listen and respond to students' personal problems; on an 8-point scale (1 = extremely ineffective, 8 = extremely ef-

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* Copies of the questionnaire are available from the authors.

fective), faculty members also rated their own effectiveness in dealing with student problems.

6. Background data, including the faculty member's sex, age, highest degree, years of faculty experience, a brief description of academic responsibilities, and the number and class/level of students taught.

Subjects for the present study were 96 full-time faculty members in U.S. schools of medicine; the sample included 86 males and 10 females. The mean age of the group was 44.9 years; the average length of academic experience was 12.16 years. Of the sample, 77.6 percent held M.D. degrees, 13.8 percent held Ph.D. degrees in their fields, 3.4 percent held master's degrees, and 5.2 percent held both the M.D. and Ph.D. degrees. The sample was representative of all clinical and basic science departments.

The faculty sample consisted of those responding to the faculty-student intervention inventories, which were mailed to faculty members of 12 schools of medicine randomly selected from among all U.S. medical schools. The 12 schools selected are geographically representative of the country. Four are in the Southeast, and two each are in the West, Midwest, Southwest, and Northeast. The questionnaires were sent to a 10 percent sample randomly selected from complete faculty listings in each school's academic bulletin. The inventory, along with a covering letter providing the rationale for the study, was mailed individually to each selected faculty member. The number of returned inventories from the 12 schools ranged from 4 to 16 for a total return rate of 41 percent. Five of the returned questionnaires had to be discarded because of insufficient data; the remainder were complete and appeared to have been carefully done.

Results

On the average, members of the medical faculty sample spent .81 hours, or 48.6 minutes, per week discussing personal problems with .93 students. It was reported that approximately 78 percent of those discussions were initiated by the students, 15 percent by the faculty members themselves, and 7 percent by a third party. Seventy-four percent of the personal problem discussions took place during regular school hours, 15 percent during lunch or break time, 9 percent after regular school hours, including weekends, and 2 percent during nondesignated "other" times. As to the location of the discussions, 76 percent took place in an office or other private area, 9 percent in a classroom or clinic, 6 percent in a location such as a restaurant or snack bar, 7 percent in a hallway or a similar area, and 2 percent in nondesignated "other" locations.

Data are presented in Table 1, on the means, standard deviations, and rank order for frequency of the discussions and the extent of the difficulty in providing help for specific problems. The most commonly occurring problems were career reconsideration, faculty-student interactions, school-related clinical issues, and school-related didactic concerns. The medical educators reported the problems with which they had the most difficulty helping students to be financial concerns, emotional health issues, and faculty-student problems.

A Pearson product-moment correlation was used to assess the relationship between the mean frequency of occurrence of problems and the perceived difficulty in helping with those problems. The resulting correlation of .75 indicated a relative dependence of ranking for difficulty and frequency by respondents;

TABLE 1

Frequency of Occurrence Means, Standard Deviations, and Rank Orders of Student Problems and Perceived Problem Difficulty Reported by National Sample of 96 U.S. Medical School Faculty Members, 1983

Student Problem	Means Frequency*	S.D.	Rank Order Frequency	Rank Order Difficulty†
Career consideration	1.38	1.14	1	7.5
Faculty-student	1.11	1.05	2	3
School related—clinical	1.02	1.03	3	6
School related—didactic	1.00	.96	4	9.5
Marriage	.86	1.00	5	4
Financial	.78	.95	6	1
Peer interaction	.72	.96	7	5
Emotional health	.69	.88	8	2
Patient-student	.63	.89	9	13
Physical health	.47	.65	10	14
School administration	.47	.68	11	7.5
Dating relationships	.35	.64	12	9.5
Sex	.31	.62	13	12
Parent-student	.28	.61	14	18
Drug abuse	.16	.52	15	11
Other‡	.16	.58	16	17
Child care	.12	.33	17	16
Alcohol abuse	.07	.25	18	15

* Based on 4-point scale (0 = very infrequent; 1 = infrequent; 2 = frequent; 3 = very frequent).

† Difficulty based on respondents ranking the three most difficult problems with which they had to deal.

‡ Examples are: choice of specialty, religious concerns, time management.

that is, respondents had more difficulty dealing with problems that occurred most frequently.

Helping strategies used by medical faculty members and the means, standard deviations, and rank order for their frequency are listed in Table 2. As can be noted, the most frequently employed helping techniques were to listen, to ask questions to draw the student out, to offer support and sympathy, and to offer empathy. Sixty percent of the sample reported that they frequently referred students with personal problems to others for help, and approximately 24 percent of the sample reported the strategy of "try to avoid getting involved" as a way of dealing with student problems.

Frequency data in the form of means, standard deviations, and rank order of the feelings faculty members experienced when asked to deal with student problems are given in Table 3. The most frequent feelings reported were those of sympathy, support, pleasure, and encouragement, while negative emotional responses to helping were reported relatively infrequently.

On a 1-through-5 scale (1 = extremely unimportant; 5 = extremely important), the mean rating of perceived importance of listening to students' personal problems was 4.35. The respondents' mean rating concerning their perceived importance of responding to students' personal problems was 4.23. Finally, on an 8-point scale of rating their own effectiveness in dealing with student problems (1 = extremely ineffective; 8 = extremely effective), members of the medical faculty

TABLE 2

Frequency of Occurrence Means, Standard Deviations, and Rank Order of Behaviors Used To Help Students by National Sample of 96 U.S. Medical School Faculty Members, 1983

Behavior	Means Frequency*	S.D.	Rank Order
Listen	1.95	1.18	1
Ask questions to draw student out	1.57	1.18	2
Offer support and sympathy	1.55	1.16	3
Put self in student's place and be empathetic	1.43	1.10	4
Get student to come up with alternatives	1.36	1.05	5
Suggest alternatives	1.34	1.01	6
Give advice	1.30	1.10	7
Share personal experiences	1.15	1.03	8
Refer the student to someone else	.93	.89	9
Actively intercede on behalf of student	.80	.89	10
Tell student cannot help	.56	.68	11
Try to be lighthearted	.47	.75	12
Tell student to count blessings	.33	.66	13
Try to avoid getting involved	.24	.43	14
Change the topic	.07	.25	15.5
Other	.07	.36	15.5

* Based on 4-point scale (0 = very infrequent; 1 = infrequent; 2 = frequent; 3 = very frequent).

sample saw themselves as moderately effective helpers (mean = 4.98).

Discussion

Despite the inherent problems of surveys and self-report research of the type reported here, the present study does provide preliminary data concerning a significant facet of medical education—the issue of faculty response to potentially stressful personal problems experienced by students.

The personal aspect of the medical student's life increasingly is being documented as a significant factor in professional training. However, the reported figure of only 48.6 minutes spent with approximately one student per week dealing with personal concerns and issues would seem to belie such importance. Particularly when compared with the reported 2.5 hours a week spent by industrial foremen in dealing with similar concerns on the part of their workers (14), this figure appears limited. On the other hand, however, it could be argued that in the hectic, never-enough-time world of medical school, the major focus of medical education is, and should be, one of providing clinical and academic experiences for the student. In such settings, little time or encouragement is typically available for the kind of personal helping interactions at issue here.

Faculty respondents in the present study reported that the problems they encountered most often were school-related in nature, that is, career reconsideration, faculty-student concerns, and school-related clinical and didactic issues. Certainly, the nature of the academic environment in which faculty members and students interact would predict such an emphasis. The next most commonly reported problems by faculty members in-

TABLE 3

Frequency of Occurrence Means, Standard Deviations, and Rank Order of Feelings in Response to Helping with Students' Personal Problems by National Sample of 96 U.S. Medical School Faculty Members, 1983

Feelings	Means Frequency*	S.D.	Rank Order
Sympathetic	1.76	1.04	1
Supportive	1.74	1.09	2
Pleased	1.34	.93	3
Encouraged	1.25	.99	4
Frustrated	.63	.75	5
Helpless	.59	.81	6
Puzzled	.58	.66	7
Uncomfortable	.53	.68	8
Depressed	.29	.53	9
Angry	.28	.52	10.5
Trapped	.28	.50	10.5
Bored	.22	.46	12

* Based on 4-point scale (0 = very infrequent; 1 = infrequent; 2 = frequent; 3 = very frequent).

cluded a grouping of problems not school-related or possibly only indirectly related—those dealing with marriage, financial concerns, peer interaction issues, and emotional health. Each of these four problem areas also was listed as among the more difficult with which the faculty members had to deal; this possibly reflected a lack of specific training and limited confidence in responding to such sensitive nonschool issues.

Among the various helping behaviors used by faculty members to respond to student problems, the most common was simply to listen. After listening, such helping strategies as asking questions and offering support and sympathy were reported with almost an equal frequency, followed by a close grouping of four other helping techniques—being empathetic, getting the student to generate alternatives, suggesting alternatives, and giving advice. Of these seven most frequently employed strategies, four of them are basically nondirective in nature (listening, offering support and sympathy, being empathetic, and getting the student to come up with alternatives), while the remaining three techniques are directive or action-oriented approaches (asking questions, suggesting alternatives, and giving advice).

The cluster of most frequently reported feelings by faculty members in response to providing help—sympathetic, supportive, pleased, and encouraged—indicates an overall positive response to being cast in the role of interpersonal helper. Although not as frequent, negative feelings such as frustration, helplessness, and puzzlement also were reported as responses to this question; this possibly reflected the lack of specific training in interpersonal helping skill areas as well as the common frustration experienced by even professional mental health workers.

The medical educators as a group felt strongly that it was important both to listen and respond to students' personal problems. Even so, the respondents only saw themselves as moderately effective (4.98 on an 8-point scale) in providing those listening and responding skills. Again, this may reflect limited training on the part of faculty members in interpersonal helping skills and thus a lack of confidence in their abilities in this endeavor. A limitation of the present study in this regard is a lack of data concerning the actual effectiveness of faculty members in helping with student problems and the effectiveness as perceived by students themselves. In addition, information is not available concerning the relative effectiveness of the various helping strategies used by faculty members. These are areas that should be explored.

As noted above, the major purpose of the study reported here was to gather data concerning the helping behavior of medical educators in dealing with their students' personal problems. Potentially important information has been elicited regarding the kinds of problems faced by medical faculties, the strategies employed by faculty members in response to these problems, the emotional impact on the faculty members as a function of their placing themselves in the role of helper, and perceptions of the importance and effectiveness of their efforts. The data are, of course, open to various judgments and interpretations, some of which are offered here. Individual schools of medicine and individual faculty members obviously can judge the applicability and heuristic value of these data for their own settings.

Finally, it should be pointed out that medical educators as well as educators in the other health professions must be aware of and respond to their students' personal or psychological concerns for functional reasons if for no other. That is, it is now well established that personal stressors can have a significant impact on the motivation and academic performance of students. Therefore, the degree to which faculty members can respond effectively to students' personal problems rather than ignore them is the degree to which the overall educational task will be made easier. Realistically, it is the faculty member who is likely to notice students who may be having personal problems, or at least their effect, and consequently be in the best position to respond to them in some fashion. It is not being suggested that medical educators all become psychotherapists. What is being suggested, however, is that the effectiveness of the professional medical educator can be improved by additional training in interpersonal skills designed to improve listening, communication, and problem-solving abilities. The need for such skills is supported by the finding of the present study that while respondents judged listening and responding to student problems as important, they saw their own skills in delivering such help as only moderately effective. The occasional continuing education offerings in this area could be expanded to meet such a training need. Or, just as important, more awareness of the value of interpersonal skills may be called for in the selection and promotion of medical faculty members. Such an emphasis and expanded role can aid in producing more professionally and personally productive medical graduates as well as more effective and satisfied medical educators, educators who will be able and inclined to do more than "try not to get involved" in students' personal problems.

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COMMUNICATIONS

Use of Anonymous Student Evaluations Of Faculty Members in U.S. Medical Schools

Stephen R. Smith, M.D., and Leslie J. Paulen

After nearly three decades of debate and numerous articles on the subject, most authorities agree that student evaluations of faculty members have both value and validity. They agree that student evaluations are able to discriminate consistently the good and bad teacher and to correlate well with other measures of teacher effectiveness, including the evaluations of other faculty members.

As the debate over whether or not to have students evaluate faculty members has subsided, a new contentious issue has arisen: Should students be allowed to retain anonymity when they evaluate faculty members?

A small number of research studies have been published relating to the issue of anonymity. Among those studies that were conducted in real classroom situations and that used control groups, all but one show a statistically significant effect of anonymity on ratings by students, indicating that faculty members were rated more favorably on positive items and less unfavorably on negative items when ratings were signed than when they were unsigned (1–4). The one study that did not demonstrate that effect was by Stone and colleagues (5).

The present study was undertaken to ascertain the degree to which the anonymity of student evaluations of faculty members takes place at U.S. medical schools. A corollary interest was to discover the extent to which student evaluations of faculty are used in deciding on faculty promotion, tenure, and salaries.

Methods

A telephone survey was conducted by the authors in June, July, and August 1983 of 126 U.S. medical schools. The Association of American Medical Colleges' *1982–83 Curriculum Directory* was used to obtain the name of the medical school, the contact person at the school, and the telephone number. At least three attempts were made to contact someone at the school who could answer the four-question survey.

Results

Of the 126 medical schools, responses were obtained from 120 (95 percent). Of the nonresponding schools, two refused to provide answers to questions posed over the telephone. The lack of a response from the rest was due to the inability of the authors to reach someone who could answer the questions despite repeated attempts. The results of the survey are shown in Table 1.

Only two schools reported that they required students to identify themselves on the evaluation form and did not guarantee anonymity. In one of them, the student's school identification number was required; in the other, the student's name was required. Eighty-three schools did not require the students to identify themselves. Nine schools classified as giving other responses all involved explanations of how anonymity was guaranteed, although students were required to put some form of identification on the evaluation sheet. This frequently involved putting students' names on front sheets that were discarded prior to being sent to the faculty members. In only one of the schools whose responses were recorded under other was the

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TABLE 1

Results of 1983 Telephone Survey of 120 U.S. Medical Schools on Use of Anonymous Student Evaluations of Teaching Faculty

Type of Evaluation	Yes Response		No Response		Other Response	
	No.	Percent	No.	Percent	No.	Percent
Students regularly evaluate faculty	93	77.5	23	19.2	4	3.3
Evaluation is written	94	98.9	1	1.1	0	0.0
Students must identify themselves	2	2.1	83	88.3	9	9.6
Evaluations used in promotion, tenure, or salary decisions	35	36.8	43	45.3	17	17.9

identity of students made available to faculty members and then only with clinical courses; anonymity was guaranteed in basic science courses in that school.

Discussion

The results of the study reported here indicate that most U.S. medical schools now have a formal system in which students evaluate the teaching faculties. Nearly all of these schools use a system to ensure student anonymity. The preponderance of data gathered by other investigators (1–4) indicates that ratings would be higher if anonymity were not guaranteed. Because of the lack of significant difference in the one study (5), Stone and colleagues suggest that ratings be signed by students. Those authors offer as justification for this suggestion the potential for better data analysis, the ability to reach the student for clarification, and a decrease in the number of random responses by students. However, these benefits are theoretical and have not been empirically tested. An opposite argument could be made that even if there were negligible amounts of response bias between signed and unsigned ratings, unsigned ratings would be preferable because response rates might be higher, students might feel freer in writing insightful comments, and they might interpret the anonymity provision as a sign of trust in their ability to act responsibly.

These conflicting arguments could and should be subjected to experimental testing. Meanwhile, the current widespread practice of using anonymous ratings by students should be continued.

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The Role of Negative Factors in Changes in Career Selection by Medical Students—Leonard A. Katz, Randolph E. Sarnacki, and Frank Schimpfhauser 285

Estimating the Number of Residents Needed in Community Teaching Hospitals—Roy Penchansky 291

The Effect of Outpatient Visit Volume on Inpatient Teaching Services—Richard A. Deyo 302

A Model for Peer Tutoring in the Medical School Setting—Leslie A. Walker-Bartnick, John H. Berger, and Murray M. Kappelman 309

Enrollment and Demographic Characteristics of Physician's Assistant Students—Reginald Carter, Joyce Emelio, and Henry Perry 316

Factors Affecting the Choice of Anesthesiology by Medical Students for Specialty Training—Phool Chandra and Mark Hughes 323

Evaluating Self-Help Support Groups for Medical Students—Ronnie Z. Goetzel, Lila G. Croen, Steven Shelov, Jo I. Boufford, and Gilbert Levin 331

Relationship Between Past Academic Performance and Results of Specialty In-Training Examinations—Ann K. Ronai, Melton E. Golmon, Colin A. Shanks, Michael F. Schafer, and Edward A. Brunner 341

Communications: Practice Patterns of Graduates of New Community-Based Medical Schools—William D. Marder 345

Gender Composition of Medical Schools and Specialty Choices of Graduates—Carol S. Weisman 347

Techniques for Evaluating Student Performance in a Preclinical Medical Ethics Course—Kenneth R. Howe and Martha S. Jones 350

Nutrition Education for Physicians—Anita B. Lasswell, Mary E. Jackson, and Larry Culpepper 352

Briefs 355

Editorial: Lengthening of Graduate Medical Education Programs 357

Bibliography 359

Letters to the Editor 364

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Enrollment and Demographic Characteristics Of Physician's Assistant Students

Reginald Carter, Ph.D., Joyce Emelio, and Henry Perry, M.D.

Abstract—The authors in this paper describe enrollment trends and provide demographic information for a representative sample of physician's assistant (PA) students enrolled during 1978–1982 in 46 PA programs accredited by the American Medical Association. In February 1983, there were 2,871 such students enrolled in 54 primary care and three surgeon's assistant programs. The typical PA program, which is two years in length, provides six to nine months of preclinical course work and nine to 15 months of clinical experience. Most programs are based in either medical schools or four-year colleges and offer baccalaureate degrees. From the demographic information obtained by the authors from this sample, the typical PA student is 28 years old and has three to four years of college and one to two years of prior health care experience. There has been a steady increase in the enrollment of women and individuals with four or more years of college. More than half of the PA students enrolled in 1983 were women. Former military medical corpsmen, who once predominated the PA profession, now represent only a small proportion of the PA student population. Most PA students continue to want to practice with family practitioners in small communities.

Physician's assistants (PAs) are skilled health practitioners qualified by academic and clinical experience to provide patient care services under the supervision and direction of a licensed physician (1). Educational programs for PAs were first established in the late 1960s largely as a result of the pioneering efforts of the Duke University Physician Assistant Program, the University of Colorado Child Health Associate Program, and the MEDEX Program of the University of Washington (2). The maintenance of high quality care, increased access to medical care services, and the containment of costs for these services remain underlying goals for the PA graduates of today. PA programs are accredited by the Committee on Allied Health Education and Accreditation (CAHEA) of the American Medical Association (AMA). Through its Joint Review Committee on Educational Programs for Physician's Assistants, the

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The project reported here was funded by the Robert Wood Johnson Foundation, the Educational Research Foundation of the American Academy of Physician Assistants, and the National Center for Health Services Research (Department of Health and Human Services).

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CAHEA evaluates programs periodically to ensure that all programs meet and maintain the established minimum standards. The review committee consists of two members each from the American Academy of Family Physicians, the American Academy of Pediatrics, the American Academy of Physician Assistants, the American College of Physicians, the American College of Surgeons, the American Medical Association, and the Association of Physician Assistant Programs.

Although much has been written about PAs, there continues to be many misconceptions about the education, backgrounds, and career interests of those entering the profession. The authors in this paper describe the current educational process, including student enrollments, and provide demographic information for a representative sample of PA students enrolled between 1978 and 1982 in 46 U.S. accredited programs.

Data Sources

Enrollment and other information about PA educational programs were compiled from data submitted by the programs to the Association of Physician Assistant Programs (APAP) in April 1982. Supplemental data for figures illustrating trends in demographic characteristics of PAs were drawn from national surveys of PA graduates conducted by the APAP in 1976, 1978, and 1981 (3–5).

Institutions

The first physician's assistant program was established in 1965, and within four years at least six additional programs were initiated in a variety of institutional settings. The major period of expansion was from 1970 to 1974, when over 30 programs began operation.

As of 1983, there were 54 accredited educational programs for the assistant to the primary care physician and three accredited surgeon's assistant programs. Four of the primary care programs are operated by the federal government. Three of the federal programs are military-based, and one is administered by the Indian Health Service. The remaining nonfederal programs are equally divided between privately and publicly operated institutions (6).

Of the 50 nonfederal, primary care programs, 16 are located in medical schools, 25 are based in schools of allied health education or four-year colleges, five are administered by community colleges, three are hospital-based, and one is located in an osteopathic medical school. Two of the three surgeon's assistant programs are based in medical schools, while the other is administered by a community college. It is important to note that regardless of the institutional setting, all programs have clinical teaching affiliations with medical schools or medical school faculties.

Since 1974, there has been a 21 percent increase in PA programs granting baccalaureate degrees. Of the 51 APAP member programs, 37 award baccalaureate degrees. Twenty-six of these 37 baccalaureate programs offer a certificate option or grant a certificate in addition to the degree, and one program offers a master of science option. The remaining programs are certificate or combined certificate/associate degree programs (7).

CURRICULA CONTENT

The typical physician's assistant educational program is a two-year program consisting of preclinical course work and clinical instruction. Preclinical study, ranging from six to 12 months in duration, includes courses in anatomy, physiology, microbiology, pharmacology, psychology, clinical medicine, physical diagnosis, clinical laboratory procedures, preventive medicine, health policy issues, and medical ethics. This is accompanied by clinical practicums lasting from nine to 15 months, which are designed to develop practitioner interviewing, physical assessment, and counseling skills. The clinical practicums, composed of clinical rotations and preceptorships, introduce the PA student to a number of potential areas of expertise, including family medicine, internal medicine, surgery, pediatrics, psychiatry, obstetrics/gynecology, and emergency medicine (1). These comprehensive preclinical and clinical experiences prepare PAs to perform duties that include: (*a*) eliciting a comprehensive health history, (*b*) performing a comprehensive physical examination, (*c*) ordering and interpreting simple diagnostic laboratory determinations, (*d*) developing diagnoses and management plans, (*e*) providing basic treatment for individuals with common illnesses, and (*f*) providing clinical care for individuals with commonly encountered emergency needs (8).

Over the past decade, a number of evaluative studies have focused on PA education in order to measure the effectiveness of programs in educating these primary care providers. This evaluative process has led to the development of a number of innovations in medical education. For example, PA educators have pioneered the use in their programs of clinical algorithms, patient management problems, computer-based clinical simulations, and patient instructors. Also, they have been innovative in the development of new teaching methodologies in clinical behavioral sciences and clinical interpersonal skills, such as role-playing, interpersonal process recall, and videotaped interviews. Patient education, interviewing and history-taking, health counseling, and preventive medicine are recognized within PA programs as integral parts of comprehensive primary care education.

Another innovation originated by PA programs, particularly the MEDEX programs, is the demonstration of how practitioners can be employed in medically underserved areas after completing preceptorships in those areas (9). This is accomplished by a deployment system which identifies and encourages M.D. preceptors located in underserved areas to employ and train MEDEX personnel who will remain in the practice upon completion of the program. Careful attention is given to matching preceptors with preceptees.

POSTGRADUATE PROGRAMS

Recently, a number of postgraduate programs have emerged to provide advanced educational experiences for physician's assistants in certain medical and surgical disciplines. Often termed "PA residencies," these programs accept graduates of PA programs and offer additional clinical and structured learning experiences in specialty areas. Presently at least 11 residency programs exist, and another is being developed. There are residencies in surgery, emergency medicine, pediatrics/neonatology, and occupational medicine. Only two postgraduate programs, one in occupational medicine and one in pediatrics, offer a master's degree.

The typical PA postgraduate program takes 12 to 15 months to complete and accepts 10 to 15 candidates each year. In 1983, these programs enrolled 95 individuals. Presently, there is only one postgraduate position available for every 15 PA students graduating each year.

Student Enrollment

In February 1983, there were 2,871 students enrolled in 54 primary care and the three surgeon's assistant accredited programs. Approximately half of these students were enrolled in the first year and half in the second year of instruction.

Class sizes ranged from a minimum of 10 students to a maximum of 50 (7). Privately operated programs had an average class size of 30.5 students, compared with an average class size of 26.5 students in publicly operated programs.

Collectively, PA programs enroll and graduate between 1,400 to 1,500 students each year. There has been little change in enrollments since the mid 1970s.

Table 1 shows a steady increase in the number of women enrolled in PA programs during 1978–1982. During this period, the proportion of women increased by about 8 percentage points and now makes up the majority of the students enrolled. Medical school-based programs had the highest percentage of women enrolled with 57 percent, and community colleges had the least with 40 percent. The number of blacks and other minorities changed little over the five-year period.

The typical applicant to a PA program is an "adult learner interested in a lifelong career in the science and art of medicine serving humanity in areas of unmet need" (10). For admission into most PA programs, candidates must have at least two years of college and from six months to one year of prior health care experience. The majority of applicants exceed these minimum requirements and have baccalaureate degrees in biological and social sciences as well as one or more years of direct patient care experience.

Applicants are encouraged to apply to several different programs, since competition is keen for the limited number of positions available. Although the total applicant pool for PA programs has not been quantified, the APAP estimates that the ratio of applicants to positions in 1983 was about four to one. This is down from a ratio of six to one reported by programs in 1978.

In 1981, the APAP surveyed its 51 member programs to collect enrollment

TABLE 1

Number and Percentage of Physician's Assistant Students by Sex and Race for the Graduating Classes of 1978–1982*

Variable	1978		1979		1980		1981		1982	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Sex										
Men	608	53.8	571	52.0	567	47.7	573	47.8	497	45.8
Women	523	46.2	527	48.0	622	52.3	627	52.2	587	54.2
Total	1131	100.0	1098	100.0	1189	100.0	1200	100.0	1084	100.0
Race										
White	981	88.6	968	89.7	1030	88.5	1033	88.1	944	89.3
Black	66	6.0	52	4.8	74	6.4	76	6.5	60	5.7
Other	60	5.4	59	5.5	60	5.1	64	5.4	53	5.0
Total	1107	100.0	1079	100.0	1164	100.0	1173	100.0	1057	100.0

* Number of programs reporting data varied from 42 to 46.

data. For the 46 programs which responded, the attrition rate of students enrolled between 1978 and 1981 was 5.4 percent. The major causes of attrition included academic, financial, personal, and family related problems (10). Many PA programs provide two or more weeks of preparatory course work and tutoring for scholastically disadvantaged students. Programs assist financially disadvantaged students to secure low interest loans, scholarships, or work-study positions. Because of the academic and time-demanding nature of the curriculum, most programs provide students academic advisers and access to psychologists, family counselors, and educational learning specialists. Students are encouraged to remain healthy through use of stress relaxation techniques, formation of support groups, and exercise programs. To share potential personal growth experiences, spouses and significant others are encouraged to attend classes and seminars on human sexuality, parenting, and other appropriate subjects.

Student Characteristics

The age distribution of male and female PA students enrolled in academic year 1981–82 is shown in Figure 1. The average age of this PA student population was 28 years. The youngest student was 20, and the oldest was 56 years old. Male students tended to be slightly older than female students. More specifically, the median age of male students was 27.2 years, compared with 26.5 years for female students. The average age of the PA student population changed little from the 27.7 years reported for academic year 1978–79. At that time, 29 percent of the males and 27 percent of the females were over 30.

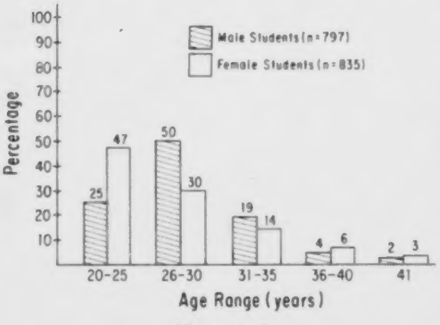

FIGURE 1

Distribution of male and female physician's assistant students by age, 1981–82.

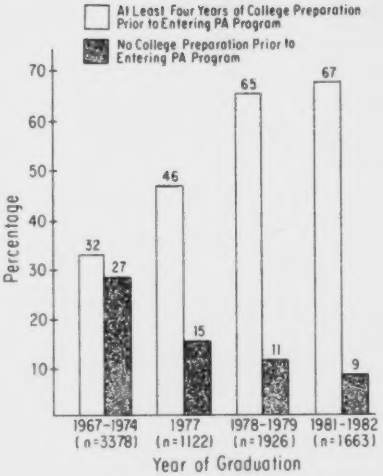

FIGURE 2

Extent of college preparation of physician's assistant students prior to entering a physician's assistant program by year of graduation.

As shown in Figure 2, prior academic preparation among enrollees has been increasing steadily. Ninety-one percent of the students responding to the 1981 national survey by the APAP had attended college, with 66 percent earning a degree. Of those not receiving degrees, about two-thirds had obtained credits equivalent to two or more years of college. About two-thirds of the baccalaureate degrees were earned in the natural sciences or health fields.

Almost all (97.6 percent) of the stu-

TABLE 2

Number, Percentage, and Median Months of Previous Health Care Experience of Physician's Assistant Students Enrolled in 1981–82 for Five Selected Health Fields

Previous Health Field	Students with Experience		
	No.	Percent*	Median (Months)
Nursing aide/orderly	542	33.5	15
Emergency medical technician	386	23.8	25
Military corpsmen	219	13.5	45
Registered nurse	139	8.6	78
Medical laboratory technician	128	7.9	23

* Based on total number responding to question, *n* = 1,619.

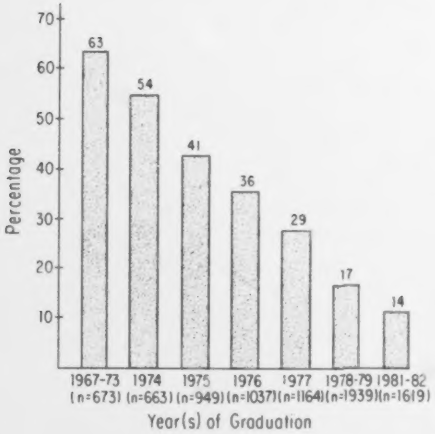

FIGURE 3

Percentage of physician's assistant students with previous military experience by year of graduation.

dents surveyed in 1981 had previous health care experience prior to beginning their PA education. About one-third of the responding students had previous experience working as orderlies or nurse's aides, one-fourth as emergency technicians, and one-fourth as registered nurses or military medical corpsmen. The median amount of previous health experience for the five selected fields is shown in Table 2, along with the percentage of students having experience in each of those fields. As shown in Figure 3, there continues to be a downward trend in the percentage of students with prior military medical corpsman experience. This downward trend is also reflected in the number of students who are veterans. Twenty percent of the 1981–82 students had been in the military as compared with 26 percent in 1978–1979.

Forty-seven percent of the 1981–82 graduating students preferred to work with family medicine or general practitioners, a decrease from the 57.8 percent who cited that preference in 1978–79. During this same period, a proportionately greater percentage (11.7 versus 8.4 percent) of students preferred to work in emergency medicine. A majority of the 1980–81 students (69.0 percent) preferred working in a community with a population of 50,000 or less, and 53 percent indicated a willingness to work in medically underserved areas.

Two-thirds of the 1981–82 students indicated a preference to practice in office or clinic settings. A slightly increased percentage of students (from 10.1 to 14.7 percent) preferred to work in a hospital setting. Otherwise, little change was noted in preference categories between 1978–79 and 1981–82 students.

Conclusions

Physician's assistant programs remain distributed fairly widely among different educational settings. Over 50 programs are offered at medical schools and four-year colleges affiliated with teaching hospitals. PA program curricula provide instruction in biomedical, behavioral, and clinical skills. Programs sponsored by the uniformed services have been maintained since the early 1970s.

Students' academic preparation prior to entering PA programs continues to lengthen. The percentage of PA students with at least four years of college education prior to beginning their PA studies has more than doubled since 1974. In addition, the vast majority of currently enrolled students have had health care experience prior to entering their PA program. Former military medical corpsmen now represent only a small percentage of the health-related backgrounds of enrolled students.

There has been little change in the demographic characteristics of the students since the academic year 1978–79, except that the enrollment of women had increased from 46.2 to 54.2 percent as of 1982–83. The majority of students continue to want to practice with family practitioners in small communities.

Physician's assistant programs have made remarkable progress in the past decade in developing innovative and relevant curricula, including the training and subsequent deployment of students to medically underserved areas, attracting high quality students, and increasing the number of women enrolled.

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Factors Affecting the Choice of Anesthesiology By Medical Students for Specialty Training

Phool Chandra, M.D., and Mark Hughes

Abstract—To learn some of the reasons why anesthesiology as a specialty is not preferred by more graduating medical students and to determine the effects of various factors on their specialty choice, the authors studied the number of medical students who chose anesthesiology as a specialty after graduation and the quality of clerkships available in various departments. The study established that medical students do not find anesthesiology as attractive as other specialties and that several factors are related to the students' choice of anesthesiology. Most surprising was the negative effect of the presence of certified registered nurse anesthetists on the operating room floor. These results suggest the need for a thorough study of the use of nurse practitioners, physician's assistants, and nurse-clinicians, at least where teaching of medical students is taking place.

It is well known that support specialties as defined by the National Resident Matching Program (NRMP) have difficulty in attracting graduate medical students. Yet the demand for the health care services of these support specialties continues at about the same or slightly higher rate than in the past. Graettinger (1) suggested in 1978 that some patient services might be met by "nurse-clinicians, assistants to physicians, and salaried house physicians." Levin and colleagues (2) in 1979 pointed out that this was the feeling of national policymakers, as represented by former Department of Health, Education, and Welfare officials (3). But is this the correct approach to meeting demand for the anesthesia services? The answer to this question depends, at least to some degree, on whether or not the use of "nonphysicians" promotes a "positive" attitude on the part of the graduating medical student. In this study, an attempt has been made to explore some of the factors surrounding the clinical clerkship setting that may affect the medical student's preference for anesthesiology.

Methods

Data related to the anesthesiology resident programs were obtained from two sources and analyzed. Data were extracted from summary statistics provided by the NRMP for 1978 and 1980–1983, and original source data were collected through the use of a questionnaire in 1980.

Information regarding the number of applications for residency positions in various specialties was statistically ana-

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lyzed. A ratio of the number of total applications to the number of positions offered was calculated for each specialty for 1978 and for 1980 through 1983. The ratios represent the preference of graduating medical students for each respective specialty. The validity of using the ratios as the dependent variable in assessing preferences instead of the percentage of positions filled for each specialty could be questioned. The strongest reason for not using the percentage filled is that it is an interval-scaled number. Therefore, it is impossible to differentiate the magnitude of differences in preference. But by using ratios for each specialty, it is possible to determine how much more one specialty is preferred than another one.

The questionnaires were sent by the authors to the chairmen of anesthesiology departments at 108 teaching hospitals. The list of names and addresses for the survey was obtained from the Society of Academic Anesthesia Chairmen. The questionnaire was accompanied by a letter explaining the object of the study. To keep the responses confidential, only code numbers were used for identification. The chairmen were asked to report whether anesthesiology was independent or part of any other department, the number and categories of teachers and other personnel, and the personnel's work load in terms of teaching and anesthesia services in relation to the department's staff and financial resources. Regarding the teaching of medical students, the information sought was the number of students in the freshman medical class; the timing and duration of anesthesia teaching in medical school; and whether the clerkship in anesthesiology was required or an elective. The authors also asked whether the students were evaluated regarding anesthesiology learning by written or oral tests and whether the students reacted favorably to this learning experience by choosing anesthesiology as a specialty. The chairmen were also asked how many medical students from their department became anesthesia residents after graduating. Information was also gathered about the residents in the departments, because anesthesia residents provide valuable help both in informal teaching of medical students and anesthesia services. This information included the number of residents, the type of clinical anesthesia teaching and rotations, and evaluations of the residents' competence.

From the information obtained, the authors attempted to relate the number of students choosing anesthesia residency programs with different variables in the clinical clerkship.

Analysis of variance was used to test statistically the data obtained from the NRMP. The specialties were compared under the constraints of a completely randomized design. Individual comparisons between the anesthesiology mean ratio and the ratios of other specialties were performed post hoc using Tukey's HSD (honestly significant difference) test (4).

Prior to any statistical testing of the survey variables, the distributions of each were examined. For categorical variables, the distribution of the number of students choosing anesthesiology was examined for each level. Normality of the data was statistically tested using the Shapiro-Wilk (5) or Kolomogorov D (6) statistics according to the size of the sample. Because none of the data met the assumption of normality, ranked statistical methods were used for the most part in testing. Spearman's Rho was used to investigate correlations. Multiple regression was performed utilizing ranked data as suggested by Iman and Conover (7). The one exception was the use of the median test to investigate the relationships of categorical variables to the number of students choosing anesthesiology.

To study further the relationships between the number of students pursuing anesthesiology and the number of anesthesiologists and certified registered nurse anesthetists (CRNAs) on the operating room floor at the same time, intervals of three were formed for both the M.D.s and the CRNAs. For example, suppose there were 13 M.D.s and 17 CRNAs. The anesthesia grouping would be the integer portion of 13 divided by 3, and the CRNA grouping would be the integer portion of 17 divided by 3. Once the groups were established for both anesthesiologists and CRNAs, the first- and second-order regression models were tested using the group interval numbers instead of the raw numbers of anesthesiologists and CRNAs.

Results

The mean ratio of medical student applications to anesthesiology resident positions was significantly different from many of the ratios for other specialties (Table 1). The ratios indicate the relative preferences for particular medical specialties. For example, the mean ratio for orthopedic surgery was 10.48; that is, there were 10.48 applications for each residency position offered. The mean ratio for anesthesiology was 3.92. Thus, the differences in the ratios showed that orthopedic surgery was preferred by the medical student more than twice as much as anesthesiology.

The medical specialties explained 76 percent of the differences in the mean ratios among the various specialties and yielded F statistic and p value of 13.48 and $< .0001$, respectively. Specialties that were significantly more preferred than anesthesiology were orthopedic surgery, obstetrics/gynecology, internal medicine, general surgery, diagnostic radiology, and pediatrics. Anesthesiology was preferred approximately twice as much as neurology and therapeutic radiology. This confirms quantitatively the observations that Graettinger (1) had made only qualitatively.

TABLE 1

Mean Ratio of Applications to Residency Positions at All U.S. Hospitals in 1978 and 1980–1983, by Specialty*

Medical Specialty†	Mean Ratio	S.E.M.
Anesthesiology	3.92	.92
Orthopedic surgery	10.48	1.34‡
Obstetrics/gynecology	8.74	.77‡
Internal medicine	7.16	.42‡
General surgery	6.62	.75‡
Diagnostic radiology	6.18	.70‡
Pediatrics	5.88	.49‡
Family practice	5.82	.27
Neurosurgery	4.48	.61
Dermatology	3.96	.35
Urology	3.92	.49
Otolaryngology	3.46	1.05
Pathology	3.08	.57
Physical medicine	2.86	.80
Psychiatry	2.64	.55
Ophthalmology	2.40	.26
Neurology	1.64	.38‡
Therapeutic radiology	1.38	.35‡

* ANOVA results: $F = 13.48$, $p < .0001$, R-square = 76 percent.

† $n = 5$ for all specialties.

‡ Significantly different from the mean ratio for anesthesiology ($p < .05$), Tukey's HSD test.

The total number of responses to the questionnaires was only 63 out of the 108 sent, despite two reminders. Of the 63 responding departments, 51 were independent, two were a part of the surgery department, and 10 others did not indicate their status. Of the institutions answering the questions, 26 handled between 10,000 to 20,000 anesthesia cases yearly, 12 had a case load of less than 5,000, 13 conducted between 1,000 and 5,000 anesthesia cases, and 9 had more than 30,000 such cases. The breakdown for regional anesthesia (where only a part of the patient's body can be made painless for surgery by local anesthesia) had only one significant piece of data; 51 institutions were doing less than 5,000 regional cases, and only two had cases between 10,000 and 20,000; the others were in between. Twenty-nine anesthesiology departments had between 11 to 20 operating rooms (ORs) to work in, 17 had less than 10 ORs, and 11 had 21 to 31 ORs and other places of responsibility.

Staffing patterns in the departments were significantly related to the number of medical students choosing anesthesiology as a specialty (Figure 1). The most significant factors were the number of full-time faculty members and the number of residents already in the residency program (Table 2). This was not surprising, as it would be reasonable to believe that the more full-time anesthesiology personnel there are in a department, the greater the possibility of fully exposing the student to the purpose and direction of anesthesiology. This was further confirmed by the significant positive correlation for number of anesthesiologists normally on duty in the operating suite. Somewhat surprising was that there was no apparent advantage, at least as far as the medical student was concerned, in having board-certified anesthesiologists within the department. Finally, the number of part-time faculty members did not correlate with the number of students choosing anesthesiology. This demonstrates that hiring part-time faculty mem-

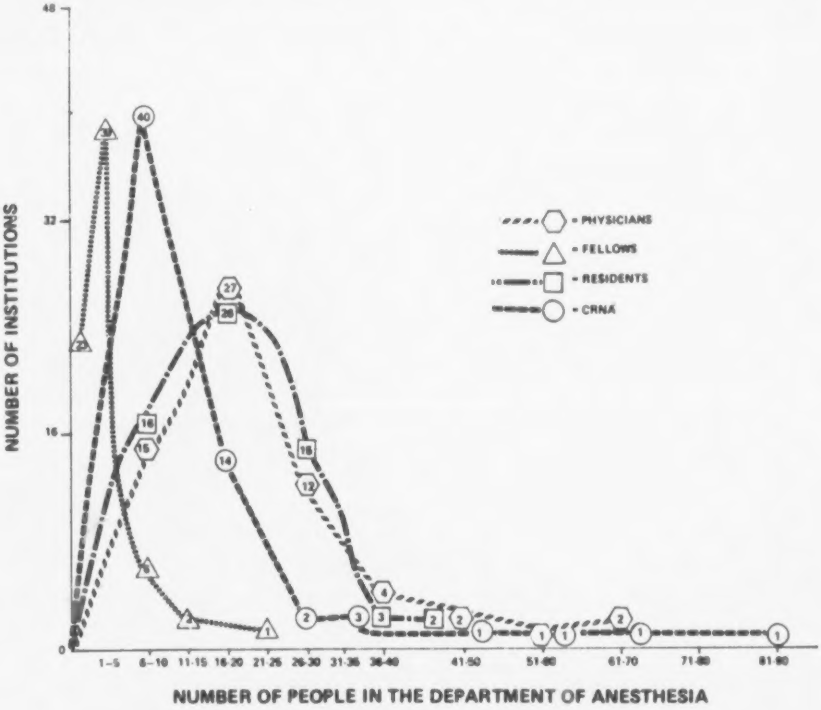

FIGURE 1
Staffing patterns in departments of anesthesia in 63 teaching hospitals, 1980.

TABLE 2

Correlation Coefficient (Spearman's Rho) for Number of Medical Students Choosing Anesthesiology and Quantitative Variables, as Reported by 63 Teaching Hospitals, 1980

Variable	Rho	*p* value	No.
Board-certified anesthesiologists	.22	NS*	61
Full-time faculty anesthesiologists	.38	.002†	63
Part-time clinical faculty	.04	NS	56
Residents	.38	.002†	63
Anesthesiologists on duty in OR	.26	.043†	62
CRNAs on duty in OR	−.21	NS	63
Clinics using anesthesiologists	.00	NS	62
Students in freshman class	.35	.005†	62
ORs in surgery suite	.17	NS	63
General anesthesia cases‡	.02	NS	62
Regional anesthesia cases‡	.05	NS	63

* NS = statistically not significant.
† Statistically significant.
‡ Number of cases per year.

bers will not ultimately affect the student's choice.

Another important factor affecting students choosing anesthesiology was support staffing patterns, especially those of CRNAs. Direct correlation of the raw data only suggested a negative relationship. But by grouping the anesthesiologists and the CRNAs in groups with three each, a significantly negative relationship is found (Figure 2). The overall regression model was significant ($p < .026$) as were the partial regression coefficients for the intercept ($p < .0001$), the number of physicians ($p < .021$), and the number of CRNAs ($p < .028$). The predicted values of the number of students choosing anesthesia were plotted against the intervals of physicians and CRNAs and represent the mean number of students expected to choose anesthesiology as a specialty for every three physicians and three CRNAs. The top regression line presents the effect of physicians without the influence of CRNAs in the operating room on the number of medical students choosing anesthesiology after graduating from school. The bottom line illustrates the negative effect on the number of students choosing anesthesiology when the CRNAs are also present and working with anesthesiologists.

Personnel from less than 8 percent of the responding anesthesiology departments performed duties on the obstetric ward, in the recovery room, or in connection with cystoscopies. The results show that there was no relationship between the number of students choosing anesthesiology and the presence of these services (Table 3). However, when considering duties performed in the intensive care unit (ICU), coronary care unit (CCU), and pain clinics, the sample sizes provided greater statistical power. A significantly greater number of students chose anesthesiology in hospitals where anesthesia services were performed in the ICUs and CCUs. Pain clinic duties performed by the students showed no relationship. Levin (2) showed that additional educational experience in various areas of anesthesiology would emphasize the full scope and broad view of the specialty and this would help most medical students appreciate and choose anesthesiology as a discipline. The results of the present study supported Levin's point only where

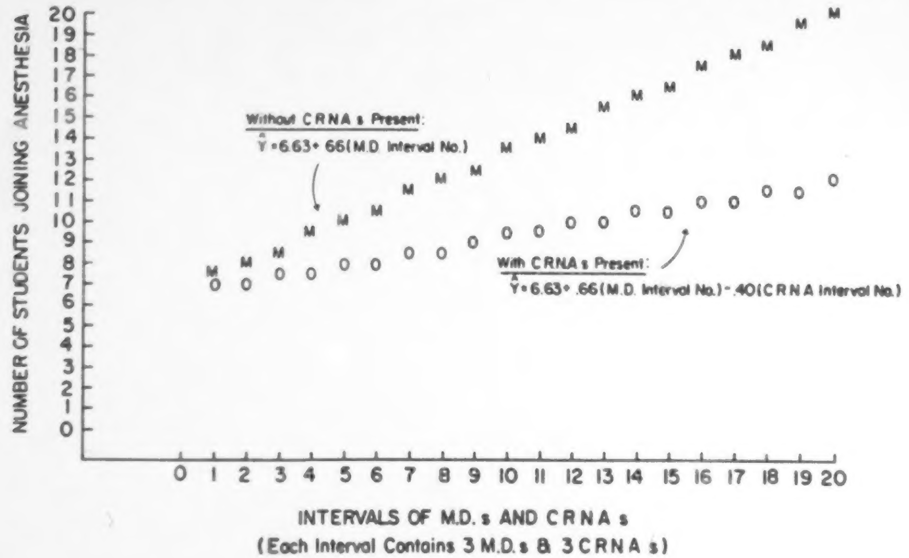

FIGURE 2

Plots of the predicted values of the mean number of students choosing anesthesiology as a specialty in relation to the presence of physicians and certified registered nurse anesthetists (CRNAs) in the operating room, based on information from 63 teaching hospitals, 1980.

TABLE 3

Comparison of Median Number of Medical Students Choosing Anesthesiology and Qualitative Variables, as Reported by 63 Teaching Hospitals, 1980

Variable	*p* value
Status of department as independent body	NS*
ICU/CCU and pain clinic duties performed†	NS
ICU/CCU only	.036‡
Pain clinic duties only	NS
Obstetric duties performed	NS
Cystoscopy duties present	NS
Recovery room duties present	NS

* NS = Statistically not significant.

† ICU/CCU = intensive care unit/coronary care unit.

‡ Statistically significant.

ICU/CCU experience was considered. Additionally, the results indicated that the number of different types of clinics did not influence the student's choice.

Finally, various other factors related to the clinical rotation setting did not significantly add to the explanation for the present shortage of anesthesiology residents. The number of anesthesia cases had no direct relationship to the student's choice, and the number of operating rooms in the surgery suite had no bearing.

Discussion

The number of CRNAs in this country is almost twice the number of anesthesiologists, and together they provide the bulk of anesthesia services. No other medical specialty is so heavily dependent on the help of a nonphysician group for its services, and this situation is far from ideal, whereby all anesthesia care could be supervised by anesthesiologists.

The relative shortage of applicants for anesthesiology residency programs is reflected in the numbers of unfilled teaching positions (8, 9). According to reports, total budgeted and available teaching positions in anesthesiology in 1976 and 1982 were 1,506 and 2,228, respectively. In 1976 and 1982 respectively, 7.7 percent and 6.2 percent of those positions were unfilled. With two exceptions, family medicine and orthopedics, the unfilled rate in anesthesiology was the highest of all the specialties.

Similarly, the reports also indicate that in the recent past, possibly due to lack of interest on the part of U.S. medical graduates, a significant proportion of residents in anesthesiology were foreign medical graduates (FMGs). In 1974, the proportion was 54 percent; in 1978, it was 38.6 percent; in 1979, 35.7 percent; in 1980, 32.7 percent; and in 1981, 28 percent. More recently, however, even though the number of first-postgraduate-year positions in anesthesiology has not changed significantly, the percentages of FMGs have been showing a downward trend. The trend probably results from the larger number of U.S. medical students, from visa restrictions that have been imposed on FMGs, and from a stricter selection process.

Levin's (2) survey of graduating medical students regarding their attitude toward anesthesiology revealed that a majority of students developed specialty interests in the early years of medical school before they had had any contact with anesthesiology. In that study, medical students perceived anesthesiology as not concerned with primary care, as boring, as insufficiently covered in medical school, and as a specialty where the anesthesiologist appears to be taking orders from dominant surgeons. A significant number of students were not aware of the role of the anesthesiologist, for example, as a specialist in airway management or problems of chronic pain. Students also ranked anesthesiology lower for the choice of specialization as compared with other major disciplines. They were also concerned with the low status and prestige of anesthesiologists and the belief that an anesthesiologist's job can be performed by nonphysicians. The present study showed a definite negative influence when CRNAs were also working with anesthesiologists in the operating room (Figure 2). Does this mean that the mere presence of the CRNA directly and adversely affects the students? It is impossible to say conclusively from the analysis, but there may be a negative indirect influence.

Levin (2) reported that a significant portion (69.8 percent) of the medical school graduates in his study believed that the typical anesthesiologist was underworked. One reason for this belief might be based on what happens when the CRNA performs some of the anesthesia services. If the student believes the anesthesiologist is doing nothing else when he has been freed by the CRNA, then it is easy to see how the nurse could indirectly contribute to the stereotypic image.

The comparative lack of interest in anesthesiology is also evident in the present study when the numbers of applicants for the positions in the different specialties are compared (Table 1).

In 1977 Epstein (10) and colleagues projected increasing needs for manpower in academic anesthesiology for teaching and a higher demand for more anesthesiologists for anesthesia services in the hospitals. They wrote that the general shortage of physicians in anesthesiology and an increasing demand for anesthesia care had also led to the recruitment of residents with substandard training and that this further worsened the deficiencies.

The need for more members on anesthesia faculties cannot be satisfied by increasing nurse anesthetists or anesthesia assistants. Thus, it is evident from the reports that more efforts are needed before the future needs of anesthesiology can be satisfied. The studies have shown that the relative shortage of applications for anesthesiology residencies can be explained to some extent by several factors: inadequate staffing of anesthesiology teaching programs both in terms of quantity and quality, poor image of anesthesiology held by graduating medical students, increasing demand for anesthesia services, and immigration restrictions on foreign medical graduates.

The results of the present study point to the need for teaching hospital departmental actions to help reduce the present relative shortage of applications for residencies in anesthesiology. As the number of students choosing anesthesiology is directly related to the number of faculty members and residents in anesthesiology departments, it is important that all vacant faculty and house staff positions be filled and that teaching should emphasize the key areas of anesthesiology responsibility in the operating room and the ICU and the CCU. As the number of students choosing anesthesiology is affected in an indirect, negative manner by the amount of anesthesia services performed by the CRNAs, the dependence on them for support of the anesthesiologists should be reduced, at least in the educational setting.

Finally, every effort should be made by the anesthesiology profession to study how medical students' attitudes concerning anesthesiology are related to the various aspects of the teaching situation with the hope of establishing guidelines that would further promote anesthesiology as a promising specialty. For other specialties which make use of nonphysicians in the delivery of health care, the precise effects should be determined to see whether there are any negative influences on the students' choices in those specialties.

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COMMUNICATIONS

Practice Patterns of Graduates Of New Community-Based Medical Schools

William D. Marder

Approximately 40 new medical schools have been established in the United States since 1960. Some of these new schools have relied on community hospitals and local practitioners for teaching clinical skills rather than traditional university-managed medical centers. Medical schools that follow this pattern have been called "community-based" schools. Advocates for community-based schools hoped that they would be particularly effective in producing graduates who would enter general and family medicine (1). Early exposure to community practice, rather than academic practice, was expected to provide attractive role models for students (2). The study reported here compared the current practice patterns of graduates of the new community-based medical schools with those of graduates of more traditional medical schools, new and old, to determine how effectively the community-based schools have been accomplishing their goal.

To focus on physicians who have completed their graduate medical education, the analysis was limited to medical school graduates between 1970 and 1975. Each medical school was assigned to one of three categories. A school was classified as "new community-based" if it was founded after 1960 and did not manage its own medical center during the period of study (3). Nine of the 21 schools founded since 1960 and before 1971 can be considered to be community-based schools. Graduates of established schools, including those that developed new community-based branch campuses (for example, the University of Alabama and the University of Oklahoma), were included in the "older school" category to avoid ambiguities, because it was not possible to distinguish which campus a particular graduate attended. New (post 1960) schools which followed traditional organizational models are classified as "other new" schools.

Each physician included in the analysis was identified in the American Medical Association's 1981 year-end Physician Masterfile (4) as being in active, office, or hospital-based practice (excluded were physicians classified primarily as administrators, researchers, faculty members, residents, or fellows). Between 1970 and 1975, there were 676 graduates of community-based schools, 1,981 graduates of other new schools, and 59,908 graduates of older schools.

Results

Table 1 presents a comparison of the specialty distributions among the graduates of the three categories of schools. Of the graduates of the community-based schools, 17.3 percent termed themselves practitioners of general or family medicine, a significantly higher percentage than was the case for graduates of older schools (12.1 percent). In addition, there was a significantly smaller percentage of surgeons among the graduates of the community-based schools. For both of these specialties, the differences between community-based and older schools were statistically significant at the .01 level based on chi-square tests.

Overall, the specialty choices of the graduates of community-based schools and those of new but more traditional schools were not

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TABLE 1

Percentage of Characteristics of Patient Care Physicians Who Earned the M.D. Degree During 1970–1975, by Type of Medical School

Characteristics	School Attended		
	New Community-Based Schools	Other New Schools	Older Schools
Specialty			
General/family practice	17.3	15.1	12.1
Internal medicine	24.5	20.8	24.5
General surgery	16.1	16.0	19.8
Pediatrics	7.3	8.4	8.2
Obstetrics/gynecology	6.1	7.1	6.5
Psychiatry	4.4	5.1	5.1
Radiology	5.6	8.1	6.9
Anesthesiology	3.9	3.4	4.1
Pathology	2.1	2.8	2.4
Other	12.7	13.7	10.6
Sex			
Female	10.8	11.8	11.4
Male	89.2	88.2	88.6
State retention*	42.6	54.2	29.6

* Practicing in state in which the physician's medical school was located.

significantly different. The percentage of community-based graduates classified as practicing general or family medicine was slightly higher than for graduates of other new schools (17.3 compared with 15.1), but this difference was not statistically significant. However, both types of new schools produced significantly more graduates in general or family practice than did the older schools. Table 1 indicates that newness appears to be a more important factor in this respect than the way the school is organized.

In addition, as shown in Table 1, community-based institutions graduated the same percentage of women during this period as did other U.S. medical schools. Thus, the growing representation of women in U.S. medical schools was apparently independent of the type of school.

Graduates of community-based schools showed statistically significant differences in their willingness to practice in the state in which their medical school was located. These differences were difficult to interpret because they may reflect many factors, including the difference in preponderance of public schools in the three groups as well as different applicant pools (5).

Conclusions

The present study showed that new medical schools graduate students who, early in their careers, have different practice patterns than graduates of older schools. The graduates of new schools are more likely to: (*a*) enter general or family medicine and (*b*) practice in the same state as their medical school. The new community-based schools are particularly effective in producing general and family practice physicians.

What is the real cause of these differences remains an open question. A reexamination of the 1970–1975 graduates 10 years from now may show changes in their professional activities away from general medicine into more highly specialized care. In addition, a similar study, performed 10 years from now, using data for graduates of classes from 1980 to 1985, would not necessarily produce results similar to those in the present study. Finally, the schools themselves may change with time. Two schools classified as community-based in this study have recently opened their own hospitals. Consequently, their current graduates would be included in the "new, more traditional" category.

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Gender Composition of Medical Schools And Specialty Choices of Graduates

Carol S. Weisman, Ph.D.

Increasing percentages of women in U.S. medical schools since 1970 have been accompanied by a wider array of specialties chosen by women entering first-year residencies to the extent that a person's gender is becoming a less powerful predictor of specialty choice. Most notably, women have been less likely than in previous years to enter pediatrics, psychiatry, and the hospital-based specialties and have been more likely to enter internal medicine and obstetrics-gynecology (1, 2). Weisman (2) interpreted these macrolevel trends in the context of Kanter's theory that as the proportion of women in organizations reaches parity with men, women will be less likely to be entrapped in limited or stereotypically "female" roles (3). Weisman, however, did not examine data at the level of U.S. medical schools nor consider variations across medical schools in the effects of gender composition on specialty choice patterns. The latter should be studied in light of the statement of the Graduate Medical Education National Advisory Committee (GMENAC) that the educational environment is critical in determining individuals' specialty choices and the recommendation for greater sociodemographic diversity in medical school classes (4).

Methods

In the present article, the author conducted an investigation of the effects of the gender composition of U.S. medical school classes on the specialty choices of graduates in the years 1970–1976, the period of greatest growth in the numbers of women in medical schools. National data on individuals were obtained from the American Medical Association and have been described elsewhere (2, 5); descriptive data on medical schools were obtained from the Institutional Profile System of the Association of American Medical Colleges.

In the analysis, the percentage of women in graduating medical school classes was the independent variable and demonstrated considerable variation across schools during the period studied. The specialty of first-year residency was the dependent variable. Since, according to Kanter's theory, higher "percent female" in a medical school is expected to be associated with less "role entrapment" of its female graduates, the present analysis focuses specifically on the choice of the traditional "female specialties" (pediatrics, psychiatry,

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and hospital-based specialties) as opposed to all others. Results of the study for residency selection of pediatrics, the largest female specialty and the one demonstrating the most dramatic trends since 1970, are highlighted here.

Findings

At the medical school level, multiple regression techniques were used to examine effects of percent female and other medical school attributes screened for high intercorrelations (for example, public or private control, region, research expenditures) on the school's percent of women graduates entering pediatrics in the first year of residency. Equations were generated separately for the 1970 to 1976 graduation cohorts. In general, a higher percentage of women was found to be negatively but weakly associated with the school's output of women in pediatrics. This result was consistent with Kanter's theory. However, the school's level of research expenditures was the most consistent predictor, perhaps because research-oriented schools have dynamic pediatrics departments. The research expenditures of medical schools and percent female were not significantly correlated.

At the individual level, the effects of percent female and other medical school attributes on the medical student's choice of pediatrics were examined. Table 1 summarizes the results of several multiple regression analyses, including those for men and women combined and separated. The first row of the table shows that there was a fairly consistent effect of class gender composition on choice of pediatrics when only the individual's gender was controlled; this is an example of a "contextual effect" as defined by Firebaugh (6). The effect, however, was positive; higher percent female increased the likelihood that the individual would enter pediatrics. This effect was not statistically significant when other covariates were introduced nor when men and women were viewed separately, although the coefficients were generally in a positive direction.

The results were similar when the choice of any of the traditionally female specialties was viewed as the outcome variable.

Discussion

The analyses at the levels of both the school and individual disclosed only weak effects of medical school class gender composition on specialty choice patterns at graduation. Trends in the data were somewhat paradoxical; among medical schools, higher proportions of women tended to be associated with smaller proportions of women entering the traditional

TABLE 1

Standardized Partial Regression Coefficient of Choice of Pediatrics in First Year of Residency on Gender Composition of U.S. Medical School Graduating Classes, 1970–1976

Covariates Controlled	1970 (W=655* M=7,527)	1971 (W=747 M=7,861)	1972 (W=770 M=8,287)	1973 (W=897 M=9,300)	1974 (W=1,232 M=9,704)	1975 (W=1,632 M=9,645)	1976 (W=1,707 M=9,627)
Individual's gender only	.024§	.011	.026§	.016	.033§	.028§	.027§
All covariates, including individual's gender†	.002	−.006	.009	.003	.019	.017	−.002
Equations for women separately‡	−.053	−.031	.062	.019	.009	.031	.030
Equations for men separately‡	.012	−.002	.003	.001	.021	.013	.009

* W = number of women, M = number of men.

† Covariates (in addition to individual's gender) are: school control (private or public); school region (northeastern/western or other); school research expenditures; average age of individuals in graduating class; individual's age at graduation.

‡ Covariates are same as above, excluding individual's gender.

§ Univariate *F*-test, $p < .05$.

female specialties; among individuals, graduating from a class with a higher proportion of women tended to increase the likelihood that a woman would enter these specialties. The findings at the individual level were not consistent with Kanter's theory but instead lent support to the GMENAC's suggestion that larger aggregations in medical schools of students with particular attributes and interests might create a peer group that reinforced or supported those orientations (7). Nevertheless, the associations found here were weak and should not be overinterpreted in view of the global trend toward diminishing sex differences in specialty choices.

Gender composition of medical schools may not be a critical variable in the specialty choice process due to historical factors. The entrance into medical schools in the 1970s of a large number of women influenced by the women's movement of the late 1960s could account for women's changing specialty choice patterns during the period observed in this study. For example, women's more frequent selection of obstetrics-gynecology may signal their growing sensitivity to women's health needs. In addition, the gender composition of medical schools is itself a product of a changing social climate in which federal legislation, such as Title VII of Public Law 92-147, the Health Manpower Act Amendments of 1971, and Title IX of the Higher Education Act Amendments of 1972 (8), reduced sex discrimination in medical school admissions and, presumably, encouraged a broader range of specialty opportunities for women within the profession. During the 1970s, women's specialty choice patterns were, therefore, likely to have changed independently of the gender composition of the particular medical schools which they attended.

Nevertheless, the variation across medical schools in patterns of women's specialty choice suggests that effects of various aspects of the educational environment (for example, female faculty role models) on future specialty choice patterns should be carefully investigated.

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Vol. 59 No. 5 May 1984

JOURNAL OF Medical Education

PUBLICATION OF THE ASSOCIATION OF AMERICAN MEDICAL COLLEGES

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Eli Ginzberg

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Results of the NRMP for 1984 (Datagram)
John S. Graettinger

Journal of Medical Education

Volume 59 • Number 5 • May 1984

Medical Progress: How Much Money Will It Take?—Eli Ginzberg 367

Effect of Three-Year and Four-Year Curricula on Physicians' Attitudes and Medical Practice—Linda K. Gunzburger, Lih-Meei Yang, and John R. Tobin 373

Financial Aid for Medical Students: A Review and a Proposal—Frances R. Hall and Peter C. Whybrow 380

A Survey on the 'Premedical Syndrome'—Robert M. Sade, Glenn A. Fleming, and G. Robert Ross 386

Procedural Skills Training in the Internal Medicine Residency—Robert S. Wigton and William C. Steinmann 392

A Survey of Clinical Skills Evaluation Practices in Internal Medicine Residency Programs—Linda L. Blank, Louis J. Grosso, and John A. Benson, Jr. 401

Predicting Medical Specialty Choice: A Model Based on Students' Records—Barbara H. Fadem, Mark J. Nicolich, Steven S. Simring, Martin H. Dauber, and Laura A. Bullock 407

Implementation and Evaluation of a Model Geriatrics Curriculum—Marcia R. Smith, Michelle L. Marcy, Terrill A. Mast, and Richard J. Ham 416

Communications: The Applicant Interview as a Predictor of Resident Performance—Eugenie Komives, Scott T. Weiss, and Robert M. Rosa 425

- **Curriculum for Undergraduate Education in Emergency Medicine**—Charles G. Brown, Arthur B. Sanders, Hubert T. Gurley, Thomas O. Stair, Vera Morkovin, and Harold A. Jayne 427
- **The Physician and the Disabled Patient: A Challenge to Medical Education**—Dennis J. McCrory and Joseph A. Marrone 429
- **A Tutorial Approach to Improving Medical Students' Interviewing Skills**—Nancy S. Betchart, Donna G. Anderson, Troy L. Thompson, II, and Emily Mumford 431
- **A Medical Ethics Tutorial Program**—Kenneth B. Wells, Pamela A. Hoff, and M. Christina Benson 433
- **An Objective Examination of Multidisciplinary Patient Conferences**—Jane S. Spiegel and Timothy M. Spiegel 436

Editorial: Medical Schools and Medical Education Cost Reduction 439

Datagram: Results of the NRMP for 1984 441

Bibliography 444

Letters to the Editor 452

Officers of the Association and Members of the Executive Council, 1983–84

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DATAGRAM

Results of the NRMP for 1984

The number of U.S. graduates (USG) who enrolled in the National Resident Matching Program (NRMP) in 1984 increased by 577 (3.7 percentage points) from a year ago (1). The increase in the number who enrolled is partially attributable to the decreased number of graduates last year that resulted from a change from a three- to a four-year curriculum in four schools. The number who subsequently withdrew decreased (Table 1), and the number of active applicants increased by 772. The proportion who were unmatched remained at 7.8 percent. Among the other U.S. and Canadian citizens, the number of "fifth pathway" applicants decreased from 447 to 425; 339 participated in the match, and 78 percent were successful, compared with 62 percent of the osteopathic graduates, 50 percent of the physician applicants, and 44 percent of U.S. citizens who were foreign medical graduates.

TABLE 1

Participation in the National Resident Matching Program in 1984

Category	U.S. Senior Students		Other U.S. and Canadian Citizens*		Alien Foreign Graduates		Total Applicants	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Applicants	16,130	100	5,376	100	7,143	100	28,649	100
Withdrew	1,389	9	2,277	42	2,931	41	6,597	23
Active participants	14,741	91	3,099	58	4,212	59	22,052	77
Matched	13,588	92	1,602	52	922	22	16,112	73
Unmatched	1,153	8	1,497	48	3,290	78	5,940	27
Total	14,741	100	3,099	100	4,212	100	22,052	100

* Other U.S. and Canadian citizens include graduating students from U.S. osteopathic schools and Canadian medical schools; physician candidates, that is, earlier U.S. graduates who are seeking an entering position in graduate medical education; "fifth pathway" students, who are U.S. nationals who completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship; and U.S. foreign medical graduates.

The number of graduates of foreign medical schools (FMG) who applied increased by 2,655. Of the 10,065 who applied, 2,992 were U.S. citizens; the number of U.S. FMG increased by 47 percentage points, and the number of alien FMG by 32 percentage points. Only 22 percent of alien FMG obtained a position.

The total number of U.S.-Canadian citizens (U.S. graduates, "fifth pathway" students, U.S. FMG, and osteopathic and Canadian graduates) who applied to the match this year increased by 10 percent.

The number of positions offered for the first postgraduate year increased by 505; 433 more were offered in the generalist* specialties than in 1983 (Table 2). The ratio of positions per initially enrolled applicant was 0.6; that of positions per USG and "other" U.S.-Canadian citizen applicant was 0.9; and that per U.S. graduate was 1.14. The ratios for active applicants in the match were, respectively, 0.84, 1.03, and 1.25.

The overall filling of positions increased by 2 percentage points; the filling of positions by U.S. graduates increased by 2 percentage points; and the filling by other applicants remained at 13 percentage points. The most competitive programs were in emergency medicine, obstetrics/gynecology, orthopedic surgery, otolaryngology, urology, and diagnostic radiology. The participation of programs

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* "Generalist" specialties are defined as family practice, internal medicine, obstetrics/gynecology, and pediatrics.

TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1984

			Applicants Matched											
Specialties	Positions Offered		U.S. Senior Students			Other U.S. and Canadian Citizens‡			Alien Foreign Graduates			Total Applicants		
				Percent			Percent			Percent			Percent	
	No.	Percent*	No.	*	†	No.	*	†	No.	*	†	No.	*	†
Family practice	2,359	13	1,773	13	75	195	12	8	43	5	2	2,011	12	85
Internal medicine	6,579	36	4,779	35	73	615	38	9	373	40	6	5,767	36	88
Pediatrics	1,915	10	1,271	9	66	188	12	10	224	24	12	1,683	10	88
Obstetrics/gynecology	1,014	5	844	6	83	111	7	11	24	3	2	979	6	97
Psychiatry	879	5	497	4	57	89	6	10	75	8	9	661	4	75
Medical specialties	90	0	56	0	62	6	0	7	2	0	2	64	0	71
Dermatology	6	0	5	0	83	0	0	0	0	0	0	5	0	83
Neurology	59	0	30	0	51	5	0	8	1	0	2	36	0	61
Ophthalmology	25	0	21	0	84	1	0	4	1	0	4	23	0	92
General surgery	2,330	13	1,831	13	79	197	12	8	67	7	3	2,095	13	90
Surgical specialties	532	3	470	3	88	39	2	7	2	0	0	511	3	96
Neurosurgery	35	0	25	0	71	2	0	6	0	0	0	27	0	77
Orthopedics	334	2	294	2	88	30	2	9	1	0	0	325	2	97
Otolaryngology	47	0	43	0	91	2	0	4	0	0	0	45	0	96
Urology	111	1	103	1	93	5	0	5	1	0	1	109	1	98
Plastic surgery	5	0	5	0	100	0	0	0	0	0	0	5	0	100
Support specialties	1,546	8	1,151	8	74	77	5	5	52	6	3	1,280	8	83
Anesthesiology	427	2	368	3	86	11	1	3	7	1	2	386	2	90
Emergency medicine	209	1	189	1	90	13	1	6	3	0	1	205	1	98
Pathology	479	3	263	2	55	31	2	6	35	4	7	329	2	69
Physical medicine	105	1	65	0	62	5	0	5	4	0	4	74	0	70
Preventive medicine	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Diagnostic radiology	291	2	252	2	87	16	1	5	3	0	1	271	2	93
Therapeutic radiology	30	0	13	0	43	1	0	3	0	0	0	14	0	47
Nuclear medicine	3	0	1	0	33	0	0	0	0	0	0	1	0	33
Transitional	1,213	7	916	7	76	85	5	7	60	7	5	1,061	7	87
Total	18,457	100	13,588	100	74	1,602	100	8	922	100	5	16,112	100	87

* Percent distributions of positions offered and filled among specialties (percentages may not add because of rounding).

† Percent of positions offered in specialty that were filled by applicants.

‡ See Table 1 footnote.

and positions in orthopedic surgery and urology again increased. The decrease of positions in neurological surgery and otorhinolaryngology is attributable to the withdrawal of many programs in order to participate in non-NRMP matches. Only a few programs in nuclear medicine and plastic surgery again participated in the match.

The distribution of matched USG among types of programs decreased slightly in the surgical specialties.

Advanced Student Program (ASP) positions were reintroduced in the NRMP this year. Twenty-three programs offered 55 positions in psychiatry and in the medical, surgical, and support specialties. The number of applications was small, and only two students were matched. Both students were also matched to programs they sought for the first postgraduate year.

For the first time in 1984, couples were not allowed to withdraw from the match to accept positions, and a new paired-choice algorithm was introduced. This change resulted in the participation of 812 individuals as 406 couples; 92 percent of these U.S. students were successfully matched.

Several specialty matches for physician candidates were carried out by the NRMP in 1983. In the summer, 95 programs offered 228 positions for fellowships in respiratory disease; 191 physicians matched to 84 percent of these positions. In the fall, 24 programs offered 47 positions in colon and rectal surgery, of which 83 percent were filled. Late in the fall, 31 programs in emergency medicine offered 200 positions; 98 percent of them were filled with physician applicants. The first specialty match for dermatology is currently in process.

Data that describe the trends in numbers of positions offered and filled by U.S. graduates and other applicants during the past several years are included in one of the NRMP's annual directories (2).

JOHN S. GRAETTINGER, M.D., *executive vice president, National Resident Matching Program; associate dean for graduate medical education, Rush-Presbyterian-St. Luke's Medical Center; and professor of medicine, Rush Medical College, Chicago.*

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MCAT and the Selection of Medical Students

Validity of the MCAT in Predicting Performance in the First Two Years of Medical School
Robert F. Jones and Maria Thomae-Forgues

The Future of Standardized Testing (Editorial)
James B. Erdmann

MCAT Scores and Student Progress in Medical School (Datagram)
Robert F. Jones and Suzanne Vanyur

Development of Clinician-Educator Faculty Track at the University of Pennsylvania
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Journal of Medical Education

Volume 59 • Number 6 • June 1984

Validity of the MCAT in Predicting Performance in the First Two Years of Medical School—Robert F. Jones and Maria Thomae-Forgues 455

Development of Clinician-Educator Faculty Track at the University of Pennsylvania—Maureen Parris and Edward J. Stemmler 465

The Quality of Deans' Letters from Medical Schools—Joel Yager, Gordon D. Strauss, and Kenneth Tardiff 471

Educational Influences on Consultation Rates of House Staff Physicians in a Primary Care Clinic—George D. Everett, Thomas J. Parsons, and Andrea L. Christensen 479

Measuring the Complexity of Clinical Problems—Brian K. Hennen 487

An Agenda for Residency Training in Ambulatory Care—Kurt Link and David Buchsbaum 494

Knowledge of Medical Students, Residents, and Attending Physicians About Opiate Abuse—Daniel Shine and Penelope Demas 501

Reducing 'Information Overload' in the Teaching of Pharmacology: The '200 Drug List'—Merle W. Riley 508

Communications: A Data Base for Curriculum Design in Medical Ethics—Richard G. Tiberius and Doreen Cleave-Hogg 512

Recognition of Outstanding Performance in Medical Schools with Nontraditional Grading Systems—M. J. Peters and W. Tyree Finch 514

Effect of Attendance at Lectures on Medical Student Performance—Karen Glanz and Stanley B. Fiel 516

Introducing Dietary Assessment to First-Year Medical Students—Susie Bredderman, Linda Nieman, and Ann Cox 518

Microcomputers for Computer-Assisted Instruction in Anesthesiology—H. Steele Holley and Floyd N. Heller 521

Briefs 522

Editorial: The Future of Standardized Testing 525

Datagram: MCAT Scores and Student Progress in Medical School 527

Bibliography 532

Letters to the Editor 536

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Validity of the MCAT in Predicting Performance In the First Two Years of Medical School

Robert F. Jones, Ph.D., and Maria Thomae-Forgues

Abstract—In this paper, the authors present the first systematic summary of predictive validity research on the new Medical College Admission Test (MCAT) since its introduction in 1977. Data are drawn primarily from the MCAT Interpretive Studies Program, a cooperative effort between the Association of American Medical Colleges and 30 of its member schools to conduct research that will both facilitate local use of the test scores and contribute to a national perspective on their value in medical school admissions. The results show that MCAT scores by themselves have significant predictive validity with respect to first- and second-year medical school course grades and National Board of Medical Examiners Part I examination scores and that they complement the predictive validity of undergraduate college grades. The MCAT Science Knowledge areas of assessment, particularly Biology and Chemistry, and the Science Problems subtest tend to have higher correlations than the Skills Analysis subtests with initial performance in medical school; however, the Skills Analysis: Reading subtest may retain its predictive value best over time. Correlation values are discussed in terms of methodological factors which constrain their size. They are also compared with those found for other professional and graduate school admission tests. Further directions for MCAT validity research are described.

Beginning with the first use of the new Medical College Admission Test (MCAT) for selecting entrants to medical school in 1978, there has been great interest among admissions officers and researchers in studies designed to assess the test's predictive validity. Eleven such studies appeared in the *Journal of Medical Education* alone during 1979–1983, while many more were the topic of presentations at professional meetings (1). The Association of American Medical Colleges (AAMC), sponsor of the MCAT, has shared this interest. In 1980 the AAMC began the MCAT Interpretive Studies Program, a cooperative effort with 30 selected schools of medicine to conduct validity research on the MCAT. The purpose of the authors in this paper is to provide a preliminary summary of the MCAT validity evidence as it relates to performance in the first two years of medical school.

There are as many questions that can be addressed concerning MCAT validity

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For related editorial and datagram, see pages 525 and 527.

as there are specific inferences to be made from the scores. The authors' purpose in this summary is to address some validity questions of general interest. The answers may not apply to each situation but reveal general patterns in the ability of MCAT scores to predict the performance of students in the basic medical sciences. Five commonly posed questions or sets of questions in this regard are:

1. How does the predictive validity of MCAT scores in relation to performance in the basic medical sciences compare with that of the undergraduate grade-point average (GPA)?
2. Do the MCAT scores contain unique information—not already provided by undergraduate GPA—that aids in the prediction of students' performance? To what degree?
3. What is the relative predictive validity of the individual MCAT scores in relation to overall performance in the basic medical sciences?
4. What is the relative predictive validity of the individual MCAT scores in relation to performance in specific areas?
5. How strong is the predictive validity of MCAT scores? Does it meet the standards that should be expected of a measure of its kind? How does it compare with that of other graduate and professional school admission tests?

Procedures

To answer these questions, results of studies were available from half of the 30 schools participating in the MCAT Interpretive Studies Program. To increase the sample, results from studies which were comparable in terms of the statistical indices used and which were from five schools not participating in the MCAT Interpretive Studies Program were added to the data from the 15 schools. Eighteen of the 20 schools are United States medical schools, 13 public and five private; two are Canadian schools. Sixteen of the schools have a traditional, discipline-oriented curriculum in the first two years, two use an organ systems approach, and two provide a mix of straight discipline courses and organ systems units. The studies were conducted separately by class, primarily those entering in 1978 and 1979. Most of the schools contributed data from more than one class, but not all types of criterion measures or statistical indices were available from all schools.

Criterion performance measures for the first two years were classified along several lines. Summary measures of first-year or second-year performance were designated year 1 grades and year 2 grades, respectively. These included criteria such as grade-point average for courses taken in a given year, class rank, or scores on an end-of-year comprehensive examination. These criteria are important for MCAT validity studies because they reflect locally determined standards of student performance. Total scores on the National Board of Medical Examiners (NBME) Part I examination provide another summary measure of performance in the basic medical sciences. The NBME Part I examination derives its importance as a criterion for MCAT validity studies from its current role in procedures for physician licensure. Subtests of the NBME Part I examination were also used as criteria to study relationships between MCAT scores and performance in specific disciplines. Local course grades or examination scores were grouped similarly by the disciplines represented in the NBME Part I examination subtests. Grades in interdisciplinary courses were too infrequently used as criteria to be examined separately in this summary.

Two statistics commonly used in predictive validity studies to index the relationship between test scores and criterion measures provided the raw data for this preliminary summary. The first was the simple Pearson product-moment correlation coefficient (*r*) or validity coefficient. Pearson correlations were computed for each MCAT scale and each undergraduate GPA measure (science, nonscience, total) with each criterion measure whose underlying measurement scale was more than simply categorical (for example, honors-pass-fail grades were not analyzed in this fashion).

Since these correlations were based on enrolled student samples which, by virtue of the selection process, are quite homogeneous with respect to the predictive measures being studied, they were then corrected for restriction of range by a commonly used formula (2). Corrected correlations attempt to estimate what the observed correlations would be if all applicants to the school, not just the more homogeneous sample of enrolled students, were studied.

The second index used was the multiple correlation coefficient. This is the Pearson correlation that results when a group of predictor variables are combined in an optimal way and related to a criterion measure. Multiple correlations were computed with all summary criterion measures (year 1 grades, year 2 grades, and NBME Part I examination score total) for (*a*) the six MCAT scores combined, (*b*) the two independent GPA measures (science and nonscience) combined, and (*c*) the MCAT scores and GPA measures combined. The size of these multiple correlations is similarly constrained by the limited range of performance on the predictive measures shown in the enrolled student samples. However, a correction formula for multiple correlations is not available.

Results and Discussion

Table 1 displays the distributions of multiple correlations computed with year 1 grades, year 2 grades, and NBME Part I examination scores, while Table 2 compares the percentage of times a GPA or MCAT composite was the better predictor of performance. Table 3 displays the average individual correlations or validity coefficients for these same criteria. Table 4 gives the percentage of times individual GPA and MCAT scores were the best single predictors of performance. Table 5 shows the average validity coefficients for criteria classified by basic science area and method of evaluation. Even at this early stage in the accumulation of data, certain patterns or trends are evident which relate to the questions posed previously.

Tables 1 and 2 show that whether MCAT scores or undergraduate GPAs were better predictors of performance in the first two years of medical school depended upon the criterion being considered. When the criteria were medical school course grades, MCAT scores in combination were similar to undergraduate grades in their predictive value. Median multiple correlations were identical, and within any one sample either predictor group was about equally likely to show a higher multiple correlation. However, as shown in Table 3, no single MCAT score tended to be correlated with medical school course grades as highly as undergraduate science GPA. When the criteria were NBME Part I examination scores, MCAT scores in combination (Table 1) were substantially better predictors of performance than undergraduate grades. This was true of every sample studied (Table 2). Moreover, several individual MCAT subtest scores (Table 3) were the best single predictors of NBME examination performance in terms of their average correlation.

The data in tables 1 and 2 also bear on the second validity question which concerns the degree to which MCAT scores contribute unique and useful information

TABLE 1

Distributions of Multiple Correlations for Grade-Point Average (GPA), Medical College Admission Test (MCAT), and GPA/MCAT Composites with Year 1 Grades, Year 2 Grades, and NBME Part I Examination Scores*

Predictor Composite	Grades		NBME Part I
	Year 1	Year 2	
GPA†			
Third quartile	.46	.42	.37
Median	.41	.37	.30
First quartile	.34	.27	.23
MCAT			
Third quartile	.49	.44	.63
Median	.41	.37	.54
First quartile	.34	.29	.43
GPA/MCAT			
Third quartile	.58	.56	.68
Median	.52	.51	.59
First quartile	.47	.40	.48

* Year 1 grades are based on 25 samples (classes) at 12 schools; year 2 grades, 22 samples at 12 schools; and NBME Part I examination scores, 18 samples at 9 schools.

† Science GPA and nonscience GPA.

TABLE 2

Number and Percentage of Samples (Classes) for Which GPA, MCAT, and GPA/MCAT Composites Were Better Predictors of Year 1 and Year 2 Grades and NBME Part I Examination Scores*

Predictor Composite	Grades					
	Year 1		Year 2		NBME Part I	
	No.	Percent	No.	Percent	No.	Percent
GPA better than MCAT	13	52	10	45	0	0
MCAT better than GPA	12	48	12	55	18	100
GPA/MCAT better than GPA alone	25	100	22	100	18	100

*Year 1 grades are based on 25 samples (classes) at 12 schools; year 2 grades, 22 samples at 12 schools; and NBME Part I examination scores, 18 samples at 9 schools.

to the admissions process. In theory, MCAT scores and undergraduate grades are complementary pieces of information. The shortcomings of one measure are the strengths of the other. The MCAT allows the assessment of students on a standard content of knowledge and skills and the reporting of scores on a standard scale but is limited to sampling performance on a single day in a somewhat artificial setting. GPA is not standardized in either way but is based on repeated assessments of a student's performance over a period of time. In the present study, the multiple correlation values provided empirical support for this complementary relationship. Those based on a combination of MCAT scores and undergraduate GPA were consistently higher than those based on either predictor group separately. The increase in the average multiple correlation when the MCAT scores were added to the GPA was .11 to .14 when course grades were the criteria and .29 when NBME examination scores were the criteria. These comparisons are usually expressed in terms of the "proportion of variance explained," that is, the multiple correlation values squared. In these terms, the MCAT scores improved predictability by as much as 90 percent with course grades as the criteria and by nearly 300 percent with NBME examination scores. Moreover, the contribution of the MCAT to predictability generalized across samples. In all cases, the increase in the multiple correlation value when the MCAT scores were added to the GPA was statistically significant.

The third question concerning how individual MCAT scores relate to overall performance in the basic sciences is addressed by the correlation values, observed and corrected for range restriction, shown in Table 3. Higher average correlations with year 1 grades were found for the MCAT Science Knowledge and Science Problems subtests than for the Skills Analysis subtests. Chemistry had the highest average correlation, with the Biology assessment area and the Science Problems subtest being only slightly less. In over two-thirds of the samples studied, either the assessment area of Chemistry or of Biology was the best predictor among MCAT scores (Table 4). Physics was the one exception to the predominantly higher correlations found for the Science Knowledge areas of assessment than the Skills Analysis areas of assessment. Its average correlation with year 1 grades was lower than the other science assessment areas, and it correlated best among MCAT scores with year 1 grades in only one of the 34 samples (3 percent).

A different pattern of results is shown with year 2 grades as the criterion. Correlations between MCAT scores and year 2 grades were all systematically lower, except for the Skills Analysis: Reading subtest. As a result, the average correlation for the Skills Analysis: Reading subtest with year 2 grades was on the same level as the correlations for the Biology and Chemistry assessment areas and the Science Problems subtest. Moreover, in 25 percent of the samples studied, the

TABLE 3

Median Individual Correlations, Observed and Corrected for Range Restriction, for Undergraduate GPA and MCAT Scores with Year 1 Grades, Year 2 Grades, and NBME Part I Examination Scores*

Predictor	Grades					
	Year 1		Year 2		NBME Part I	
	Observed	Corrected	Observed	Corrected	Observed	Corrected
Undergraduate GPA						
Science	.36	.54	.35	.47	.29	.43
Nonscience	.21	.26	.22	.26	.14	.17
Total	.37	.50	.34	.45	.25	.35
MCAT						
Biology	.34	.38	.23	.29	.40	.50
Chemistry	.31	.42	.23	.28	.43	.56
Physics	.26	.29	.14	.16	.34	.37
Science Problems	.31	.39	.22	.27	.43	.50
Skills Analysis: Reading	.19	.26	.21	.28	.24	.32
Skills Analysis: Quantitative	.24	.27	.16	.21	.29	.38

* Year 1 grades are based on 34 samples at 18 schools; year 2 grades, 28 samples at 16 schools; and NBME Part I examination scores, 26 samples at 14 schools. Larger numbers than in Table 1 reflect the availability of data from published studies.

TABLE 4

Number and Percentage of Samples (Classes) for Which Individual GPA and MCAT Scores Were Best Single Predictors of Year 1 Grades, Year 2 Grades, and NBME Part I Examination Scores*

Predictor	Grades					
	Year 1		Year 2		NBME Part I	
	No.	Percent	No.	Percent	No.	Percent
Undergraduate GPA						
Science	28	82	18	64	21	81
Nonscience	0	0	0	0	0	0
Total	6	18	10	36	5	19
Total samples	34	100	28	100	26	100
MCAT						
Biology	11	32	6	21	5	19
Chemistry	12	35	8	29	13	50
Physics	1	3	1	4	0	0
Science Problems	5	15	2	7	7	27
Skills Analysis: Reading	3	9	7	25	1	4
Skills Analysis: Quantitative	2	6	4	14	0	0
Total samples	34	100	28	100	26	100

* Year 1 grades are based on 34 samples at 18 schools; year 2 grades, 28 samples at 16 schools; and NBME Part I examination scores, 26 samples at 14 schools.

Skills Analysis: Reading subtest was the best MCAT predictor of year 2 grades, only slightly less than the percentage for the Chemistry assessment area. These findings appear to reflect the persistent nature of the skills differences shown in the Skills Analysis: Reading scores. Differences in Science Knowledge scores that students exhibit on the MCAT are reduced by the time they complete the first year of the basic science curriculum. These differences are then less useful for predicting the relative performance of students in the second year. The medical school curriculum presumably has a less direct impact in reducing differences in the more basic skills measured by the Skills Analysis: Reading subtest. Therefore, while the Science Knowledge and Science Problems subtests are better predictors of how students perform initially in medical school, the Skills Analysis: Reading subtest may be one that is more enduring.

The Science Knowledge and Science Problems subtests showed the highest correlations with performance on NBME Part I examination scores. In half of the samples studied, the Chemistry assessment area was the best MCAT predictor. In the remaining samples, usually either the Science Problems subtest or the Biology assessment area was the best MCAT predictor.

Data in Table 5 address the fourth question of how MCAT scores relate to specific areas of the curriculum. First, the data reinforce a point made earlier in this paper. MCAT correlations within each basic science area were consistently higher when performance was measured by subtests of the NBME Part I examination. This occurred despite the fact that anatomy, physiology, and biochemistry courses are taken typically in the first year of medical school, a full year prior to sitting for Part I of the NBME examinations. Undergraduate GPA tended to be more highly correlated in each area with local course grades than with NBME examination scores.

MCAT Science Knowledge subtest and

TABLE 5

Median Individual Correlations (Corrected for Range Restriction) for Undergraduate GPA and MCAT Scores with Grades and NBME Scores in Specific Disciplines

Predictor	Anatomy		Physiology		Biochemistry		Pathology		Microbiology		Pharmacology		Behavioral Science	
	Grade	NBME	Grade	NBME	Grade	NBME	Grade	NBME	Grade	NBME	Grade	NBME	Grade	NBME
Undergraduate GPA														
Science	.40	.35	.47	.38	.44	.36	.42	.36	.43	.34	.40	.40	.31	.15
Nonscience	.21	.10	.24	.08	.25	.08	.23	.20	.24	.10	.22	.18	.26	.16
Total	.39	.29	.42	.29	.39	.29	.41	.35	.39	.27	.40	.29	.34	.18
MCAT														
Biology	.27	.40	.35	.47	.31	.39	.24	.35	.29	.38	.19	.30	.21	.38
Chemistry	.21	.43	.45	.61	.41	.54	.25	.37	.23	.40	.28	.44	.19	.37
Physics	.17	.26	.37	.48	.23	.32	.10	.16	.08	.23	.17	.25	.12	.34
Science Problems	.21	.40	.45	.59	.36	.46	.21	.35	.25	.38	.23	.39	.21	.39
Skills Analysis: Reading	.11	.17	.22	.27	.14	.16	.21	.25	.21	.26	.23	.19	.34	.51
Skills Analysis: Quantitative	.14	.26	.33	.42	.23	.27	.12	.18	.19	.21	.15	.22	.21	.44

Science Problems subtest scores showed particularly strong correlations with performance in two areas of the curriculum: physiology and biochemistry. In fact, the one exception to the generally lower correlations for the MCAT Physics assessment area compared with other Science Knowledge assessment areas was in terms of performance in physiology. The pattern of correlations between MCAT scores and performance in specific areas tended to be consistent with content similarities. The MCAT Biology assessment area had higher correlations than other MCAT assessment areas with course grade performance in anatomy and microbiology. The MCAT assessment area of Chemistry had higher correlations with performance in biochemistry and pharmacology. In addition to the MCAT assessment area of Chemistry and the Science Problems subtest, MCAT Biology and Physics assessment areas and the Skills Analysis: Quantitative subtest each showed high correlations with performance in physiology. Finally, the Skills Analysis: Reading subtest was the best predictor of performance in behavioral science courses and the Behavioral Sciences subtest of the NBME Part I examination.

These comparisons of correlation values show the relative predictive validity of the MCAT subtests in relation to several different performance criteria. Of further interest is the magnitude of these correlations and what this implies about the strength of predictive validity. Any predictive measure with a validity coefficient greater than zero provides some advantage over a random process in selecting students who will perform well. But is the size of these correlations what one would hope for in a measure of this kind?

This question can be addressed only after recognizing several factors in these studies which artificially constrain the size of the validity coefficients obtained. These are (*a*) effects due to selection which render the enrolled student samples unrepresentative of the corresponding applicant pools in terms of range of ability; (*b*) effects of limited variance on the criterion measure; and (*c*) effects of low reliability of the criterion measure. The authors partially dealt with the first factor, referred to as the restriction of range problem, by correcting the individual validity coefficients. However, recent research (3) indicates that even these upward adjustments are probably too conservative. They do not provide a substitute for the ideal experiment of studying students randomly selected from the applicant pool. Golmon and Berry (4) in their study of students at Northwestern University Medical School have come closest to this ideal situation and have shown the dramatic differences that result.

The second factor, the effects of limited variance on the criterion measure, also was partially dealt with in this study by performing correlational analyses only for those criterion measures with a minimally adequate distribution of student performance. However, Sedlacek and Hutchins (5) demonstrated that even rather small differences between samples with regard to criterion variance are reflected in the size of the validity coefficients obtained.

The third factor, the potentially low reliability of certain criterion measures, is based on the psychometric tenet that validity cannot exceed reliability. This applies particularly to course grades or local examination scores, whose reliability was not known to the authors. While many of the criteria used in these studies may have high reliability, the presence of even some with low reliability would serve to lower the average of the coefficients obtained.

With these considerations in mind, the authors can describe certain levels of strength in the predictive validity of MCAT scores. Multiple and individual correlations with NBME examination scores reflect extremely strong predictive validity. In general, these indices rarely exceed the values shown for measures of this kind. Correlations with first-year grades demonstrated fairly strong predictive validity, particularly with regard to performance in physiology and biochemistry courses. The incremental predictive validity described earlier of MCAT scores combined with GPA was the primary consideration here. The MCAT/GPA combination achieved a level of predictive validity with medical school course grades only slightly less than with NBME Part I examination scores. Correlations between individual MCAT subtests and second-year grades reflected only moderate to weak predictive validity. However, the predictive validity of the MCAT score composite tended to be in the moderate to fairly strong range, which might encompass coefficients of .3 to .5.

MCAT validity results tend to be comparable with those found for the other graduate and professional school admission test programs. For example, in one study (6), the average observed validity coefficients for the Law School Admission Test (LSAT), with first-year law school grades as the criterion, tended to be in the .3 to .4 range. Correlations between scores on the Graduate Record Examination (GRE) Aptitude Tests and graduate school grades varied by area of study but averaged approximately .3. Those for the GRE Advanced Tests tended to be higher but were still only in the .3 to .4 range. Results for the Graduate Management Admission Test were similar, with median validity coefficients being approximately .3, according to a report by Lawrence W. Hecht and Donald E. Powers, "The Predictive Validity of Preadmission Measures in Graduate Management Education: Three Years of the GMAC Validity Study Service," presented as a symposium paper at the annual meeting of the American Educational Research Association, New York City, March 1982. Each of these tests was validated under similar constraints as the MCAT, and the results need to be viewed accordingly.

Conclusion

The MCAT Interpretive Studies Program is a major effort by the AAMC to conduct research on the test used in medical school admissions. The results of validity studies conducted through the program thus far tend to support the MCAT's value as a predictive measure in the medical school admission process and to support its continued use to the degree that the criterion performance measures that have been studied are deemed important. A systematic examination of research results has revealed some obvious trends. The authors expect that the identification of these trends will give perspective to validity research being conducted now and in the future. The exceptions to these trends are no less important. As more data accumulate, the plan is to study how exceptions relate to specific characteristics of a particular school and curriculum and the nature of performance measures. More data will also allow further study into the methodological factors previously described that hamper accurate validity assessments.

Two further directions for MCAT validity research are in progress. The first relates MCAT scores to absolute measures of success/failure in medical school and measures indicative of academic problems. These include withdrawal/dismissal from medical school for academic reasons, delayed graduation due to repeating courses or deceleration of the academic program, and/or failure to pass Part I of the NBME examinations. These data should prove useful to those interested in establishing a threshold at which applicants may equally be expected to satisfy the academic demands of the medical school curriculum.

The second direction for research is to examine the nature and extent of relationships between MCAT scores and measures of performance in the third- and fourth-year of medical school. These are given the general label of clinical performance measures, although they represent several distinct types. Clinical knowledge measures include scores on the NBME Part II examination, NBME mini-tests, or in-house examinations used by schools in the computation of clerkship grades. These measures might reasonably be expected to correlate both with basic science knowledge measures and the MCAT. Clinical skills measures are themselves of two kinds: (*a*) those that imply a cognitive skill, for example, appropriate emphasis on pertinent facts in history-taking or the ability to integate clinical information from various sources to identify a problem, and (*b*) those that are primarily noncognitive in nature, for example, sensitivity to a patient's overall medical and personal problems and effectiveness in securing the cooperation of patient and family. Those MCAT subtests which assess skills in gathering, analyzing, and evaluating information may be expected to correlate with the former type of clinical skill measure but not the latter. However, knowing the full implications of using MCAT scores in admissions demands that relationships among all these measures be examined. This is also true with regard to the career choices made by medical students during this period. The AAMC's MCAT Interpretive Studies Program has as its goal to describe this multifaceted picture of the implications of test use.

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DATAGRAM

MCAT Scores and Student Progress in Medical School

In an article appearing in this issue of the journal, the authors summarize correlations found between Medical College Admission Test (MCAT) scores and student achievement in the first two years of medical school as measured by course grades and scores on the National Board of Medical Examiners (NBME) Part I examination. A validity question of further practical import to admissions committees is how MCAT scores relate to the probability of a student having academic problems that delay or impede his progress through medical school. As with most questions of test validity, this is best answered from local institutional experience with the MCAT scores. However, local studies are inevitably hampered by the low incidence of students who experience academic problems, presumably because of the effective use of various measures of academic achievement and student motivation in the selection process. The purpose of the authors in this datagram is to demonstrate the relationship between MCAT performance and student progress through medical school for the enrolled U.S. medical student population as a whole. While such a data aggregation may mask differences between institutions, it should provide some perspective for schools interested in establishing a minimum threshold level of performance at which a student may reasonably be expected to satisfy the demands of the medical school curriculum in the normal time period.

Method

The population studied includes all students who entered in 1978 and 1979 the 126 medical schools accredited by the Liaison Committee on Medical Education (LCME). Academic status records of each student are maintained in the Student Records System of the Association of American Medical Colleges (AAMC), beginning with the matriculation date and ending at the point of graduation or other termination. Changes in status are provided periodically by the schools to the AAMC. A majority of students entering in 1978 and 1979 were expected to graduate in either 1982 or 1983, respectively.

From information contained in the Student Records System, the authors grouped students into five categories: (*a*) graduated on time, (*b*) delayed graduation for academic reasons, (*c*) delayed graduation for nonacademic reasons, (*d*) withdrawal/dismissal for academic reasons, and (*e*) withdrawal/dismissal for nonacademic reasons.

Students were classified in group A if their actual graduation date was no later than two months subsequent to their original expected graduation date indicated at the time of matriculation. While these may include students who experienced some academic problems in medical school, these students would have managed to rectify the problems in time to graduate with their class. Students who graduated later than the expected date or who continued to be enrolled were classified in groups B or C. Those students who took a leave of absence for nonacademic reasons (for example, for health reasons) were placed in group C. The remaining students who maintained continuous enrollment were presumed to have decelerated their program or to have been made to repeat part of the curriculum because of academic difficulties. These assumptions were necessary because direct designations of the reasons for changes in expected graduation dates are not provided in the reporting system. Students who withdrew or were dismissed from medical school were classified in groups D or E, depending upon whether the school reported that the withdrawal/dismissal was for academic or nonacademic reasons. Exceptions to this were those students who subsequently reentered

TABLE 1

MCAT Chemistry Scores of 1978 and 1979 First-Year Entrants to U.S. Medical Schools by Retention and Rate of Progress

MCAT Chemistry Score	All Entrants		Graduated on Time		Delayed Graduation				Withdrawals/Dismissals			
					Academic†		Nonacademic‡		Academic		Nonacademic	
	No.	Percent	No.	Percent§	No.	Percent §	No.	Percent§	No.	Percent§	No.	Percent§
12–15	5,629	18.0	5,034	89.4	257	4.6	196	3.5	11	0.2	131	2.3
11	5,193	16.6	4,740	91.3	200	3.9	137	2.6	26	0.5	90	1.7
10	5,776	18.4	5,264	91.1	235	4.1	142	2.5	38	0.7	97	1.7
9	5,383	17.2	4,849	90.1	233	4.3	133	2.5	49	0.9	119	2.2
8	4,060	13.0	3,587	88.3	204	5.0	108	2.7	71	1.7	90	2.2
7	2,668	8.5	2,239	83.9	186	7.0	96	3.6	83	3.1	64	2.4
6	1,493	4.8	1,193	79.9	174	11.7	49	3.3	47	3.1	30	2.0
5	705	2.2	488	69.2	102	14.5	36	5.1	52	7.4	27	3.8
4	317	1.0	178	56.2	84	26.5	11	3.5	29	9.1	15	4.7
3	90	0.3	48	53.3	22	24.4	3	3.3	12	13.3	5	5.6
2	23	0.1	7	30.4	7	30.4	3	13.0	4	17.4	2	8.7
1	2	0.0	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
Total	31,339*	100.0	27,628	88.2	1,705	5.4	914	2.9	422	1.3	670	2.1

* A total of 32,354 students were identified as 1978 and 1979 first-year entrants. This table excludes 551 students enrolled in B.A./M.D., M.D./M.A., M.D./Ph.D., and M.D./J.D. programs, 51 deceased students, and 413 students without new MCAT scores.

† Includes repeaters, students in decelerated programs, and academic withdrawals/dismissals who reentered medical school.

‡ Includes those who took leaves of absence or delayed progress in transferring.

§ Percentages based on the total number of students at each particular score level.

TABLE 2

MCAT Skills Analysis: Reading Scores of 1978 and 1979 First-Year Entrants to U.S. Medical Schools by Retention and Rate of Progress

MCAT Reading Scores	All Entrants		Graduated on Time		Delayed Graduation				Withdrawals/Dismissals			
					Academic†		Nonacademic‡		Academic		Nonacademic	
	No.	Percent	No.	Percent§	No.	Percent§	No.	Percent§	No.	Percent§	No.	Percent§
12–15	2,651	8.5	2,378	89.7	123	4.6	84	3.2	9	0.3	57	2.2
11	4,130	13.2	3,705	89.7	181	4.4	124	3.0	17	0.4	103	2.5
10	8,452	27.0	7,643	90.4	348	4.1	231	2.7	68	0.8	162	1.9
9	5,921	18.9	5,310	89.7	271	4.6	167	2.8	56	0.9	117	2.0
8	5,384	17.2	4,768	88.6	286	5.3	137	2.5	81	1.5	112	2.1
7	2,749	8.8	2,332	84.8	201	7.3	87	3.2	61	2.2	68	2.5
6	868	2.8	694	80.0	77	8.9	30	3.5	37	4.3	30	3.5
5	691	2.2	492	71.2	110	15.9	34	4.9	43	6.2	12	1.7
4	249	0.8	162	65.1	47	18.9	15	6.0	22	8.8	3	1.2
3	144	0.5	86	59.7	34	23.6	4	2.8	18	12.5	2	1.4
2	53	0.2	30	56.6	14	26.4	1	1.9	5	9.4	3	5.7
1	47	0.1	28	59.6	13	27.7	0	0.0	5	10.6	1	2.1
Total	31,339 *	100.0	27,628	88.2	1,705	5.4	914	2.9	422	1.3	670	2.1

* A total of 32,354 students were identified as 1978 and 1979 first-year entrants. This table excludes 551 students enrolled in B.A./M.D., M.D./M.A., M.D./Ph.D., and M.D./J.D. programs, 51 students who are deceased, and 413 students without new MCAT scores.

† Includes repeaters, students in decelerated programs, and academic withdrawals/dismissals who reentered medical school.

‡ Includes those who took leaves of absence or delayed progress in transferring.

§ Percentages based on the total number of students at each particular score level.

medical school; they were classified in groups B or C, depending upon the reasons for the withdrawal/dismissal. In order to classify students into these five categories, students enrolled in B.A./M.D., M.D./M.A., M.D./J.D., or M.D./Ph.D. programs and others whose original expected graduation date was later than November 1983 were dropped from the analyses, since graduation data would not have been available at the time the analyses were performed. In addition, students who died during the study period and students without new MCAT scores were not included.

Findings

Tables 1 and 2 show for two selected areas of assessment, Chemistry and Skills Analysis: Reading, the number and proportion of students at each MCAT score level who were classified into each of these five groups (tables based on scores for other MCAT areas of assessment are available from the authors). The results indicate that 88.2 percent of the 1978 and 1979 first-year entrants graduated on time. A total of 8.3 percent had their graduation delayed, 5.4 percent for academic reasons and 2.9 percent for nonacademic reasons. Of the 3.4 percent of the students who either withdrew or were dismissed, 1.3 percent were for academic reasons while 2.1 percent were for nonacademic reasons. The data reveal a positive relationship between performance on the MCAT and graduating on time and an inverse relationship between MCAT performance and both delayed graduation for academic reasons and withdrawal/dismissal for academic reasons. The proportion of students withdrawing or delaying progress for nonacademic reasons tended to be fairly uniform across the range of MCAT scores. The probability of experiencing academic difficulties showed little variation for those students achieving scores between 8 and 15 on the MCAT Chemistry and Skills Analysis: Reading subtests. However, for those scoring below 8 on either subtest, the probability of encoun-

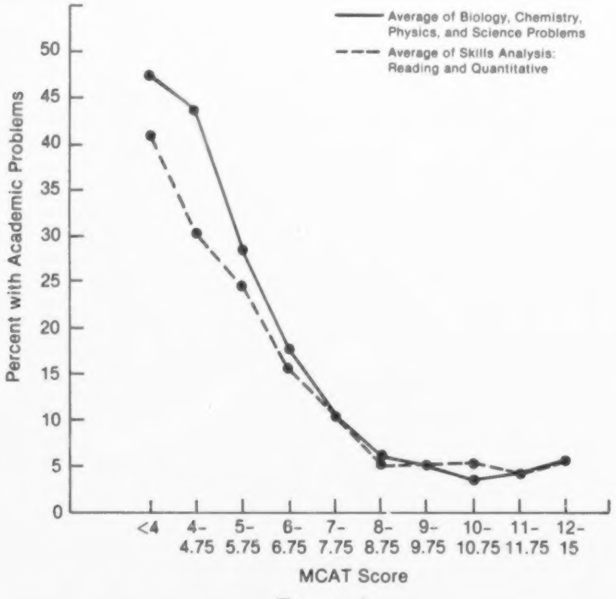

FIGURE 1

Percentage of students having academic problems in U.S. medical schools by Medical College Admission Test (MCAT) scores, 1978 and 1979 entering classes.

tering academic problems tended to increase systematically as MCAT scores decrease.

Figure 1 illustrates further the relationship between MCAT performance and the likelihood of experiencing academic problems by comparing scores for the Science Knowledge and Science Problems subtests with those for the Skills Analysis: Reading and Skills Analysis: Quantitative subtests. For simplicity of presentation, students whose academic problems caused a delay of graduation or withdrawal/dismissal were grouped together, and MCAT scores were averaged within the science and skills areas. For both averages, the likelihood of a student experiencing academic problems increased consistently as scores declined below 8 on either measure. The increase tended to be slightly more pronounced as the Science Knowledge and Science Problems subtests scores decline. Since academic problems tend to surface in the first year of medical school, this finding is not surprising. For both the old and the new MCAT, the strongest correlations with first-year performance have been found for MCAT scores in the science areas of assessment.

Even at the very lowest levels of MCAT performance, approximately half of the small numbers of students who were accepted were successful in graduating from medical school on time. This appears to reflect the effectiveness of admissions committees in identifying other factors that predict student success in addition to MCAT scores. The graduation rate also argues against an absolute and rigid use of MCAT scores in admissions decisions but for its use as contributing information to a complete applicant profile.

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Medical Care and the Academic Centers

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(Editorial)
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Volume 59 • Number 7 • July 1984

Impact of the Evolution in Health Care Delivery on the Academic Medical Center—R. B. Friedman 539

The Effect on Academic Health Centers of Tertiary Care in Community Hospitals—David A. Gee and Lisa A. Rosenfeld 547

Program Relationships of Community Hospitals and Medical Schools in CME—Robert H. Younghouse, Jr., and William H. Young 553

Professionalization of the Older Medical Student—Jerald Kay and Marguerite Blythe 559

Maximizing Patient Care Services To Improve Funding in a Family Medicine Residency—W. MacMillan Rodney and Rex J. Beaber 567

Medical Student Counseling: The Rush Medical College Adviser Program—Edward J. Eckenfels, Robert S. Blacklow, and Gerald S. Gotterer 573

Teaching Interviewing Skills to Medical Students: The Issue of 'Countertransference—Robert C. Smith 582

Communications: **Six-Year Documentation of the Easy Grader in the Medical Clerkship Setting**—R. Dennis Marienfeld and John C. Reid 589

Understanding the Clinical Performance of Physicians: A Factor Analysis Approach—Louise Arnold, T. Lee Willoughby, and E. Virginia Calkins 591

A Model for Interschool Teaching of Humanities During Clinical Training—Jacqueline Glover, Joanne Lynn, Edmund Howe, Laurence McCullough, Marian Secundy, and Harry Yeide 594

A Regular Physical Exercise Program for Medical Students: Learning About Prevention Through Participation—Barry S. Levy, Robert Goldberg, James Rippe, and Donald Love 596

Severity of Patient's Illness: An Important Factor Contributing to Laboratory Costs in a Teaching Hospital—Constantine Stefanu, Ray G. Newman, Mary L. Pate, Marilyn B. Chassie, and Ron J. Anderson 598

Analysis of Practice Interviews of Medical Students with Elderly Persons—Christine Prendergast, Rodney M. Coe, Carol Echsner, and Alberto Galofré 600

Physiological Aspects of Memory Related to Improvement of Teaching a Multidisciplinary Subject—E. W. Powell 602

Editorial: The Influence of Medical Practice Competition on the Academic Medical Center's Educational Mission 605

Bibliography 607

Letters to the Editor 612

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Program Relationships of Community Hospitals And Medical Schools in CME

Robert H. Younghouse, Jr., Ed.D., and William H. Young, D.Ed.

Abstract—In this paper, the authors report on a nationwide study that examined continuing medical education (CME) "programmatic linkages" between medical schools and community hospitals. Data were gathered to answer two major questions. To what extent are U.S. medical schools currently involved with community hospitals in providing cosponsored, accredited CME programs on an ongoing basis for hospital staffs? How do such programs differ one from the other? Data obtained indicated that a majority (70 percent) of the medical schools have CME programmatic linkages with community hospitals and that these relationships were viewed as very positive and beneficial.

For the past 50 years the literature has provided insufficient data on medical school/community hospital cooperation in continuing medical education (CME). Pioneering literature from the University of Michigan (1), Tufts University (2), and Albany Medical College (3) provided a base for action. Later studies at Stanford University School of Medicine (4), the University of Connecticut School of Medicine (5), Yale University School of Medicine (6), and the University of Southern California (7) provided more data concerning efforts undertaken by these institutions in conjunction with community hospitals. Authors such as Vollan (8), Freymann (9), Manning (10), Firestone and Howard (11), Bergin and Holmes (12), and Block (13) highlighted the importance of hospital-based continuing medical education and, to some degree, the need for close relationships between medical schools and community hospitals.

The purpose of the study reported here was to determine the extent of medical school/community hospital cooperation in cosponsored, accredited CME programs in community hospitals; to discuss how the programs differ in terms of procedures for planning and development, including needs assessment, faculty selection and involvement, teaching methodology, and evaluation; to determine the benefits of such cooperative educational programming; and to make recommendations for medical school/community hospital cooperation.

Methods

Following a review of the literature, the investigators undertook interviews with University of Illinois College of Medicine leaders in CME to prepare adequately a national survey instrument. Using de-

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scriptive research techniques, the investigators then developed a survey questionnaire to collect data. Qualitative and quantitative data were requested via 21 forced-choice questions and two open-ended questions which required 15 to 30 minutes of response time.

The sample consisted of 123 deans or directors of continuing medical education at medical schools accredited by the Liaison Committee on Medical Education in the continental United States in 1981. The collection of data was completed in November 1982. Two mailings were utilized, and 92 completed questionnaires representing 75 percent of the sample were returned with usable data.

Data from questionnaires were analyzed on the basis of descriptive statistics. Forced-choice responses were analyzed quantitatively using frequency tabulations, measures of central tendency, and chi-square analysis.

Results

On the basis of the literature review, it was hypothesized that no more than 25 percent of the medical schools in the sample would have cosponsored, accredited CME programs with community hospitals that were ongoing and conducted in the hospitals.

However, an analysis of the data rejected that hypothesis. Seventy percent (64) of the individuals responding indicated that their respective medical schools had such a cooperative programming activity. Of the institutions represented, 70 percent were public, and 78 percent were located in a city where there were no other medical schools within a radius of 25 miles. The mean number of hospitals involved in cosponsored arrangements with individual medical schools was 11.8, ranging in distance from the medical school from less than one mile to over 75 miles.

Among the medical schools involved in this type of educational activity, there was a disparity regarding procedures for planning and developing the courses, assessment of physicians' educational needs, teaching methods, faculty selection and involvement, evaluation, benefits, and factors important in sustaining the "programming linkages" with the hospitals.

The typical cosponsored, programmatic activity as defined by the data was conducted on a monthly basis (30 percent), averaging one to two hours in length (70 percent). In 40 percent of the cases, the length of the activity was determined jointly by the community hospitals and the medical schools. In most cases (89 percent) the medical schools had administrative responsibilities for awarding credit for the programs. Full-time medical school faculty members were used more frequently (59 percent) as instructors than any other resource. A majority (64 percent) of faculty members were paid honoraria by community hospitals. A large majority (84 percent) of faculty members were also paid travel and other expenses by community hospitals. Lecture presentations dominated (77 percent) the instructional strategy utilized in presenting information to hospital medical staffs. Participatory methods were found to be least utilized (9 percent). On a scale of 1 to 5 (1 = never, 5 = always), needs assessment is usually (mean = 3.6; S.D. = 0.9) conducted by hospital CME committees making use of physician staff surveys. Responsibility for faculty selection was equally divided between medical school directors of continuing medical education (mean = 3.3; S.D. = 1.0) and community hospital directors of medical education (mean = 3.2; S.D. = 0.8). Post-program evaluations continued to monopolize the methodology used to evaluate the programs (mean = 4.1; S.D. =

0.9). Follow-up questionnaires were used occasionally (mean = 2.6; S.D. = 1.0); program pre-post tests or audits were seldom used (mean = 1.9; S.D. = 0.8).

The major benefit connected with cosponsoring programs was providing physicians with accredited CME activities in their own hospitals. Eighty-one percent of the sample judged this benefit to be "very important." The least important benefit was the additional sources of income for the medical school; 76 percent judged this as "not at all important" or "not very important" (Table 1).

The major factor in sustaining medical school/community hospital programming linkages was a commitment on the part of the hospital medical staff, This item on the questionnaire was designed to be answered by all respondents regardless of whether or not their medical schools had program arrangements with community hospitals. The data indicated that 73 percent of the respondents to this question had joint programs and that 27 percent did not. The commitment to cosponsored CME programming of the community hospital medical staff was judged to be "very important" by 79 percent of the respondents whose medical schools were involved in this kind of activity and by 61 percent of the respond-

TABLE 1

Mean Scores of 64 U.S. Medical School Deans or Directors of CME Responding to Questionnaire Indicating the Benefits of CME Programs Cosponsored by Medical Schools and Community Hospitals, 1982

Benefits	Mean*	S.D.
Provided physicians with CME credits in their own hospital	3.7	0.6
Fulfilled part of medical school's mission and goals	3.6	0.5
Provided communication link between medical school faculty and hospital physicians regarding patient care problems	3.6	0.6
Increased medical school's image and visibility	3.5	0.5
Provided cost-effective means of obtaining CME programs for staff physicians	3.3	0.6
Provided visibility to new medical school faculty members	3.1	0.9
Increased referrals to medical school's teaching hospital or clinic	3.1	0.8
Enabled hospitals to conform to JCAH standards†	3.0	0.7
Provided visibility to experienced medical school faculty	3.0	0.8
Improved teaching skills of medical school's faculty	2.3	0.7
Improved undergraduate and graduate teaching relationships	2.2	0.9
Increased joint medical school/community hospital research activities	2.2	0.9
Provided additional sources of income for medical school	1.8	0.8

* 1 = not at all important, 2 = not very important, 3 = somewhat important, 4 = very important.

† Joint Commission on Accreditation of Hospitals.

ents whose medical schools were not. The least important factor was distance to community hospitals from the medical schools. Nineteen percent of the respondents whose medical schools had joint programs indicated that this factor was "very important," compared with 35 percent of the respondents whose medical schools did not have such programs. Respondents by category judged six of seven factors as "somewhat" to "very important" in terms of mean averages (Table 2).

Discussion

This study was undertaken primarily because of a lack of information available in the literature regarding nationwide CME program linkages between medical schools and community hospitals. The major finding indicated that a majority of medical schools in the continental United States were involved in cooperative CME programs with community hospitals.

Medical school deans or directors of CME whose own institutions are not currently involved in this kind of educational activity and who wish to explore the possibilities of initiating such programs can start by disseminating and discussing information and publications about successful medical school/community hospital CME linkages at national, state, and regional continuing professional education meetings.

Based on the findings and implications of this study, as well as on literature sources, the following administrative model for cosponsored medical school/community hospital programming linkages is set forth:

1. Initial or continuing commitment. Medical school directors of CME should assess and continually reassess the commitment to cosponsored CME programming activities with community hospitals on the part of both faculty members and clinicians, since a major finding of the study indicated this factor was very important in sustaining or initiating these activities.

2. Needs assessment. A systematic effort on the part of continuing education providers to determine the educational needs of physicians through surveys, medical audits, interviews, and discus-

TABLE 2

Mean Scores of 86 U.S. Medical School Deans or Directors of CME Responding to Questionnaire Indicating Factors Important in Sustaining CME Programs Cosponsored by Medical Schools and Community Hospitals, 1982

Factors	Mean*	S.D.
Community hospital medical staff commitment	3.7	0.5
Community hospital administration commitment	3.6	0.5
Medical school faculty commitment	3.6	0.6
Medical school administration commitment	3.6	0.6
Medical school/community hospital relationships	3.5	0.5
Availability of other types of CME activities in hospital	3.0	0.7
Distance of community hospital(s) from medical school	2.9	0.8

* 1 = not at all important, 2 = not very important, 3 = somewhat important, 4 = very important.

sions should be undertaken. These educational needs are then translated into learning objectives. Data should be gleaned from community hospital physicians before any medical school faculty member becomes involved in the process of program development. Medical school deans or directors of CME whose needs assessment activities are medical school-based should reassess this portion of their program development strategy. Ideally, the community hospital is the logical focal point for the identification of needs. The medical school then becomes the educational resource for the community hospital to meet these needs.

3. Faculty selection and involvement. Faculty members should be selected by both the medical school and community hospital, but final approval for the faculty should rest with the medical school. Once this has been achieved, the faculty must work with the appropriate representatives of the community hospital medical staffs in the preparation of program content. This would enhance the degree of inter-institutional decision-making and communication typically missing from other CME programs which are conducted at remote sites by medical schools.

4. Teaching methodology. The study indicated that the most utilized method of instruction was live didactic presentations. Medical school directors of CME should take into consideration the fact that high technology delivery of CME is the wave of the future and should explore additional or alternative methods of remote program delivery through the use of teleconferencing, closed-circuit television, and computer programming systems that link the medical schools with outlying community hospitals. However, the instructional strategies should be based upon three major criteria: (*a*) faculty members' ability to use the technology or method involved, (*b*) community hospital physicians' preferred method of learning, and (*c*) cost-effective measures of program delivery.

5. Evaluation. The findings of this study show that postprogram evaluations continue to dominate program evaluation strategies. Medical school directors of CME should recognize the utility of follow-up questionnaires, pre-post program examinations, and pre-post patient review audits as viable and important evaluation tools. Evaluation methods should be determined jointly but remain the primary responsibility of the medical schools.

6. Financial responsibilities. The findings indicated that community hospitals are the primary financial source for payments of honoraria and travel expenses. Medical school directors of CME should reevaluate the financing arrangements of their cooperative programs with community hospitals if their schools provide the sustaining support for this kind of educational activity. This can be accomplished on an annual contractual basis or on a program-by-program basis.

The model described here demonstrates the need for extensive communication and decision-making on the part of the medical schools and community hospitals for the development and maintenance of high quality educational activities in community hospitals. As indicated by the findings, the benefits of this kind of joint arrangements were very advantageous to the medical schools, community hospitals, and, ultimately, physicians.

Continuing medical education for the physician must be considered a partnership between institutions which have a stake in health care. A linkage is required to join the needs for educational and professional growth of the individual physician with the educational and service delivery capacity of the medical schools to provide better health care. The development and expansion of the kinds of CME programming activities described here together with the intervention of new instructional modes and strategies can provide this linkage.

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Vol. 59 No. 8 August 1984

JOURNAL OF Medical Education

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Volume 59 • Number 8 • August 1984

Undergraduate Medical Education in Prepaid Health Care Plan Settings—Joseph C. Isaacs and Morton A. Madoff 615

Paradigms and Problem-Solving: A Literature Review—Eta S. Berner 625

Diversity in Membership of Medical School Admissions Committees—N. L. Eckhert and E. J. Cronin 634

Graduate Medical Education and the Law—Cynthia H. Grieger, Natalie K. Shemonsky, and Robert E. Driscoll, III 643

Participation in Continuing Medical Education of General Practitioners in New Zealand—Philip M. Barham and John Benseman 649

Osteopathic Physician Location and Specialty Choice—J. S. Denslow, Michael C. Hosokawa, James D. Campbell, Carl R. Roberts, and Michael E. Samuels 655

Factors Associated with Behavior Change in Family Physicians After CME Presentation—Kristi J. Ferguson, Richard M. Caplan, and Paul S. Williamson 662

Communications:

- **An Evaluation of a Preparation Program for Medical Students Who Previously Failed Part I of the NbME Examinations**—Robert Blanc and Deanna C. Martin 667
- **An Interdepartmental Division of Geriatric Medicine**—Harvey Jay Cohen, Gregg Warshaw, and James T. Moore 669
- **A Learning-Curve Approach to the Self-Assessment of Internal Medicine Training**—Susan C. Day, E. Francis Cook, H. Richard Nesson, Marshall A. Wolf, and Lee Goldman 672
- **Enhancing Career Opportunities in Medicine and the Sciences for Minority Students**—William A. Thomson, Robert E. Roush, Quentin W. Smith, and J. David Holcomb 675
- **Sex Stereotypes in the Self- and Ideal Descriptions of Physician's Assistant Students**—Stephen W. Davis, Deborah L. Best, Gail Marion, and Geoffrey H. Wall 678
- **Briefs** 680

Editorial: Administration's VA Budget Request: Too Small for Needed 682

Book Reviews 684

Bibliography 686

Letter to the Editor 690

Officers of the Association and Members of the Executive Council, 1983–84

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Undergraduate Medical Education In Prepaid Health Care Plan Settings

Joseph C. Isaacs and Morton A. Madoff, M.D.

Abstract—The authors in this article focus on prepaid health care plan (PHCP) involvement in undergraduate medical education and report the results of two surveys undertaken to determine the extent of such involvement. Additionally, the authors provide a review of published studies that have examined the costs of such training. The survey findings show that current use of PHCPs for educational purposes is distributed throughout all four years of undergraduate medical education and is apparently on the rise. In addition to 26 medical schools reporting formal educational arrangements with health maintenance organizations, 35 other schools indicated that they either planned or were seriously considering such arrangements with PHCPs, had ongoing ad hoc arrangements with PHCPs, or attributed their lack of an arrangement to an absence of appropriate opportunities rather than to any conceptual reservations. Three studies represented the extent of the published research that could be identified on the costs of formal undergraduate clinical training in PHCPs. Serious inconsistencies in the methodologies employed in those studies resulted in widely varying and even contradictory findings.

Despite differences of opinion about the extent of a projected oversupply of physicians, policymakers in government and academic medicine have recognized that primary care practitioners continue to be in short supply. The federal government, for its part, has targeted the shrinking number of health professions education dollars to primary care training programs. At the same time, the medical education community has continued its efforts to expand beyond the traditional tertiary care training grounds and identify additional primary care educational opportunities in ambulatory care settings. One such setting, prepaid health care plans (PHCPs), such as health maintenance organizations (HMOs), has experienced steady growth over the past decade. The federal Office of Health Maintenance Organizations reported that the number of HMOs nationwide grew from 30 in 1970 to 243 in 1982. Total membership in HMOs rose from 2.9 million to 10.3 million in the same period. Respecting these trends, the academic medical community has a growing interest in the feasibility and usefulness of PHCP sponsorship or affiliation for both educational and patient care purposes.

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Presumably, the participation of medical students in undergraduate and residents in graduate ambulatory care training results in substantial costs. Those costs are attributable, among other things, to the reduced productivity of members of the medical and professional staff because of the presence of medical students, additional overhead expenses for instructional facilities, faculty compensation, and payment of stipends to residents at the graduate level. Up until now, administrators of PHCPs have shown considerably more interest in participating in graduate than in undergraduate medical training. At the graduate level, PHCPs receive the service benefit of the residents' clinical participation and may potentially recruit them for their staffs. Involvement in undergraduate medical education, on the other hand, is generally viewed by the PHCP as a more costly proposition. Medical students offer limited service benefits and require more instructional time from staff members. In this article, the authors will focus on undergraduate level training.

As price competition and cost-consciousness become more intense among providers of health care, the issue of financing undergraduate and graduate ambulatory care training in the PHCP setting will become more contentious. If the financial viability of these settings as primary care training sites is to be assessed adequately, accurate identification of the costs involved will be critical. The extent and forms of PHCP involvement in undergraduate ambulatory care training to date, as well as the published studies that have examined the costs of such training, will be examined in this article.

Two Surveys

The Association of American Medical Colleges (AAMC) conducted a survey of U.S. medical schools to identify (*a*) the extent of the formal involvement of undergraduate clinical medical education with prepaid health care plans, such as health maintenance organizations and individual practice associations (IPAs), and (*b*) the methods and data being used to analyze the costs associated with medical education in those settings. The formal involvement with PHCPs was understood to mean that an established agreement existed between the medical school and the PHCP.

At approximately the same time, a Tufts University questionnaire was sent to all operational PHCPs in the United States asking about their current and/or planned association with medical student teaching activities within their ambulatory settings and the hospitals to which they referred their enrollees. They were also asked whether they had carried out cost analyses of these educational activities.

The AAMC survey questionnaire was mailed in July 1982 to the deans of all 127 of the nation's medical schools. A follow-up mailing to 30 nonrespondents was made in November 1982. By January 1983, a total of 124 responses were received for a 97.6 percent overall response rate. Of these respondents, 26 (or 21.0 percent of all respondents) reported that their medical schools had some formal arrangement with one or more health care plans to enable undergraduate medical students to receive a portion of their clinical training, on either a required or elective basis, in such settings. The 26 schools listed a total of 32 PHCPs with which they had programs. Surveys undertaken in 1974 and 1977 had found that fewer than 15 percent of the academic medical centers nationwide had developed a formal educational affiliation with an HMO (1, 2). Of the 98 schools having no arrangements as of the 1982 survey, 17 reported that there were plans to pursue such relationships in the future. Seven others stated that such activities were under consideration. Thus, at 50 (or 40.3 percent) of the responding medical schools, formal arrangements with PHCPs to provide the setting for undergraduate clinical education activities either existed, were planned, or were under serious consideration. In addition, eight other medical schools noted arrangements with PHCPs on an informal ad hoc basis for curriculum electives.

The Tufts survey was conducted from April to September 1982. A total of 249 operational PHCPs nationwide were sent questionnaires. Of these, 154 were returned for a 61.8 percent rate of response. Of the respondents, 44 (or 28.6 percent) reported involvement with 44 medical schools in undergraduate medical training, and 73 (or 47.4 percent) noted some type of health professions teaching. The variance between the undergraduate figure and the findings of the AAMC survey may be attributable to the lower overall response rate achieved by the Tufts survey and the fact that it did not differentiate between formal and informal (ad hoc) medical center/PHCP arrangements. The latter factor contributed to the finding that several HMOs indicated the existence of teaching relationships where medical schools reported none in the AAMC survey. On the other hand, the results of the Tufts survey regarding health professions training generally were very similar to the findings of a 1979 study of 77 HMOs by Fink (3). The 1979 research indicated that 62 percent of the responding HMOs with enrollments greater than 2,000 had some form of medical staff involvement in undergraduate medical training and that 75 percent participated in some form of health professions education (for example, graduate medical education or allied health training).

Among the 44 PHCPs responding affirmatively to the Tufts survey, 26 were begun before 1975 and 16 after 1975; two did not report their starting date. On the basis of the size of their prepaid enrollment, four listed less than 5,000 members, seven from 5,000 to 10,000 members, 19 from 10,000 to 50,000 members, and 12 more than 50,000 members. Two did not specify the number of their members. On the basis of their organizational type, 25 were staff model HMOs, 13 were group model, three were individual practice associations and three took some other form (for example, group network). In a staff or group model HMO, the physicians are direct salaried employees of the HMO and practice in a group setting as staff or are members of a group practice that has a contract with the HMO to see primarily prepaid patients. In the IPA model, individual physicians have contracts with the IPA, are paid on a fee-for-service basis, and practice in their own offices seeing both prepaid and fee-for-service patients. Five of these PHCPs indicated that they had conducted cost analyses of their undergraduate teaching activities.

Thirty-three of the responding PHCPs reported the number of medical students in training in their settings. Among the eight group models reporting this figure, the number of students taught ranged from 2 to 109 (mean = 42, S.D. = 42.7). For the 20 staff models reporting this figure, the range was from 1 to 68 (mean = 11, S.D. = 15.7). The number of students taught did not show a significant relationship to either the size or the age of the PHCPs.

Undergraduate Affiliations

As noted previously, the 26 medical schools reporting formal PHCP affiliations for undergraduate education in the AAMC survey indicated that their arrangements were with 32 staff or group model HMOs. Four of these schools reported utilization of multiple PHCPs (that is, two schools each had arrangements with two different HMOs, while two other schools each had arrangements with three). Geographically, the vast majority (20 out of 26) of the medical schools reporting affiliations were located either in the west or northeast, where the preponderance of U.S. medical schools are located. Of the 11 western schools reporting affiliations, six are situated in California. Eight of the western respondents (including all those in California) have arrangements with PHCPs in the Kaiser-Permanente system. A listing of the 26 schools, the PHCPs with which they are affiliated (that is, through some formal arrangement), and the types of teaching activities involved is presented in Exhibit 1 on the basis of geographic location.

Seventy-nine percent (98 out of all 124 respondents) said that primary care experience in an ambulatory care setting was a required part of the medical school's curriculum. Only 61.5 percent (16 out of 26) of those schools having a formal undergraduate arrangement with a PHCP reported this curriculum requirement. Of the 98 schools reporting no formal PHCP arrangements, 82 (or 83.7 percent) did require ambulatory care training experience. In addition, among the 26 medical schools with a PHCP affiliation, only six (23.1 percent) indicated that training specifically in a prepaid health care plan setting was a requirement of their curricula. These involved the medical schools at Cornell University, George Washington University, Morehouse College, Texas A & M University, Wayne State University, and the University of Washington.

Extent of Educational Activity

Findings from the AAMC survey on the extent (that is, number of students and types of training) of undergraduate medical education in HMOs are summarized in Table 1. Eleven of the 26 medical schools (42.3 percent) with formal PHCP arrangements use them for training in the first year of their undergraduate programs. Such training usually takes the form of 1-to-4-hour seminars weekly to introduce clinical medicine to as few as two and as many as 120 freshmen. However, the majority of those first-year seminars in PHCPs are conducted for groups of between two and 20 students. In addition to introductory seminars, first-year students at two medical schools, the University of California at Los Angeles (UCLA) and the University of Washington, participated at the PHCPs in physical diagnosis.

Twelve of the 26 PHCP-affiliated schools (46.2 percent) used the prepaid settings for training in the second undergraduate year, involving from three to 100 sophomores, the latter at the University of Minnesota Medical School in Minneapolis. Generally, however, classes included from 10 to 20 second-year students. Two schools offered seminars (as they did in the freshman year) introducing clinical medicine in the PHCP setting to sophomores. During the sophomore year, however, undergraduate activity at PHCPs usually involved instruction and experience in physical diagnosis. The amount of training time devoted to physical diagnosis at the PHCPs varied from 30 to 294 hours extended over a 12-to-14-week period. The latter program was at the Harvard Community Health Plan, where six second-year students received training in physical diagnosis for seven hours per day, three days per week, over a 14-week period.

In the third year of undergraduate medical training, 14 of the 26 PHCP-affiliated schools (53.8 percent) used the PHCP setting for both seminars and clerkships involving between 15 and 175 students. The student figures at the University of California at Los Angeles and George Washington University were unusually high at 175 and 150, respectively. In most cases, however, the third-year PHCP clerkship programs involved between 24 and 44 students. As reported by 10 of the 14 schools, this training consisted primarily of required clerkships in such disciplines as medicine, surgery, pediatrics, obstetrics and gynecology, community health, and family medicine. These clerkships ranged in length from one to six weeks, with most falling at the high end of the range.

Eighteen of the 26 PHCP-affiliated schools (69.2 percent) sponsored fourth-year training at PHCPs. This activity usually takes the form of one or more elective clerkships which emphasize not only various medicine and surgery subspecialties but also outpatient and ambulatory care with a particular orientation toward primary care in the PHCP setting. These senior-year elective clerkships typically last four or six weeks, though a University of Washington urology clerkship was two weeks long, and a clerkship in medicine for seniors at the University of California at San Francisco lasted 14 weeks. The number of fourth-year students participating in the PHCP-based elective clerkships ranged from as few as two at two schools to 72 in an elective clerkship in medicine at the University of Hawaii. However, in the majority of the fourth-year clerkship programs cited, only from two to 10 students were involved.

Education Costs in PHCPs

Six medical schools in the AAMC survey (23.1 percent of those with formal PHCP arrangements) reported that they provide financial compensation to the PHCP specifically for support of medical student teaching activities. They are the University of North Dakota School of Medicine, the University of Washington School of Medicine, the Medical College of Pennsylvania, the University of California, Davis, School of Medicine, the University of Hawaii John A. Burns School of Medicine, and George Washington University School of Medicine and Health Sciences.

Although a number of studies have been conducted to calculate the costs of residency training programs in the PHCP setting (4–6), published research findings on the costs of undergraduate programs in such settings have been limited essentially to studies at the George Washington University Health Plan (7–9). Deans at two other medical schools replied affirmatively to the question whether or not any study was planned or had been conducted by the medical school or PHCP to determine or estimate the costs of undergraduate medical student instruction in the prepaid health care plan setting. They were the deans of the medical schools at the University of Washington and the University of California at Davis. However, it was learned from telephone follow-ups in October 1983 that the University of Washington study was still in progress and that the University of California at Davis study had gone unfunded. The three George Washington University Health Plan studies of undergraduate training costs were completed in 1977, 1979, and 1980.

In 1977, Lindenmuth and colleagues (7) examined the effect of third-year clinical clerks on physician productivity in the George Washington University Health Plan. The physicians kept logs of the length of each of their clinical sessions and the number of patients seen during

EXHIBIT 1

Formal Undergraduate Medical Training in Prepaid Health Care Plan Settings by Medical School and Geographic Location, Affiliated Health Maintenance Organizations (HMOs), and Educational Activity, 1982

Location and School	Affiliated HMO	Educational Activity
Northeast		
Brown University	Rhode Island Group Health Association	Freshman and junior seminars and senior elective clerkships
University of Connecticut	North Central Connecticut HMO	Freshman and sophomore seminars and senior elective clerkships
Cornell University	La Guardia Hospital	Junior required clerkship and senior elective clerkship
George Washington University	George Washington University Health Plan	Sophomore seminar, junior required clerkship, and senior elective clerkship
Georgetown University	Kaiser Georgetown Community Health Plan	Senior elective clerkship
Harvard University	Harvard Community Health Plan	Freshman and sophomore seminars, junior and senior elective clerkships
University of Massachusetts	Fallon Community Health Plan	Freshman and sophomore seminars and junior seminars and required clerkship
Medical College of Pennsylvania	HMO of Pennsylvania	Senior elective clerkship
Tufts University	Matthew Thornton Health Plan	Senior elective clerkship
South		
Morehouse College	Health Care, Inc.	Freshman and sophomore seminars
Texas A & M University	Centroplex Health Plan	Junior and senior elective clerkships
Midwest		
University of Minnesota, Minneapolis	Group Health Plan	Sophomore seminars and senior elective clerkship
University of North Dakota	Hettinger	Senior elective clerkships
Wayne State University	Health Alliance Plan, Comprehensive Health Service of Detroit, Group Health Association of Southeast Michigan	Freshman seminars and senior elective clerkships
Washington University (St. Louis)	Medical Care Group of St. Louis	Freshman seminars

Exhibit 1 (continued)

West		
University of Arizona	Prima Care, El Rio Neighborhood Health Center	Junior required clerkship and senior elective clerkship
University of California, Davis	Kaiser Hospital, Sacramento	Sophomore seminars, junior required clerkship, and senior elective clerkships
University of California, Los Angeles	Southern California Kaiser	Freshman seminars, junior and senior required clerkships, and senior elective clerkships
University of California, San Francisco	Kaiser Foundation Hospital, San Francisco; Kaiser, Honolulu; Kaiser, Oakland	Freshman and sophomore seminars and senior elective clerkship
University of Hawaii	Kaiser-Permanente	Junior and senior required clerkships and senior elective clerkships
Loma Linda University	Kaiser-Permanente Medical Care Program	Junior required clerkship
University of New Mexico	Lovelace Medical Center	Senior elective clerkships
Oregon Health Sciences University	Kaiser-Permanente	Junior required clerkship
University of Southern California	Kaiser-Permanente	Freshman and sophomore seminars and senior elective clerkship
Stanford University	Kaiser-Permanente, Midpeninsula Health Service	Freshman and sophomore seminars, junior required clerkship, and senior elective clerkship
University of Washington	Group Health Cooperative of Puget Sound	Freshman and sophomore seminars, junior and senior required clerkships, and senior elective clerkships

the session. All patients were asked to indicate on a questionnaire whether they were seen by a physician alone or by both a medical student and a physician and whether or not they were satisfied with the care provided. It was found that students significantly increased the number of patients seen during a clinical session without significantly adding to the length of a session or the rate of dissatisfaction among patients. The findings suggest that third-year medical students can provide services to offset the costs introduced by their presence and, therefore, can represent a net benefit to physician productivity in the primary care practice setting.

Using the same third-year primary care clerkship as in Lindenmuth's study, Pawlson and colleagues (8) examined medical student instructional costs and obtained results contradictory to the earlier study. The cost of education in the Pawlson study was determined by a cost-finding technique similar to the methodology developed by Carroll in his pioneering studies in teaching hospitals (10). Equal importance was given in the study to the teaching, research, and patient care functions, and the allocated costs for those functions were shared proportionately. The teaching of third-year medical students occupied 22 percent of the time of faculty physicians in clinical sessions in the HMO practice. Based on faculty members' overall time allocation and/or actual salaries, the total faculty labor costs (teaching and supervision) amounted to $35.20 per student per day. The overall cost per student per day for the clerkship was $54.20, with the faculty cost component accounting for the largest portion.

In 1980, using an incremental cost approach, Pawlson and colleagues (9) examined the cost of instructing medical

TABLE 1

Undergraduate Medical Education in Prepaid Health Care Plan Settings By Year of Training, Number of Participant Schools Responding, Range of Student Involvement, Type of Activity, and Duration of Training, 1982

Year of Training	No. of Schools ($n = 26$)	No. of Students		Type of Educational Activity	Duration
		Range	Modal Range		
Freshman	11	2–120	2–20	Seminars to introduce clinical medicine Physical diagnosis	Seminars—1 to 4 hours weekly
Sophomore	12	3–100	10–20	Physical diagnosis Seminars introducing clinical medicine	Physical diagnosis—30 to 294 hours over 12 to 14 weeks
Junior	14	15–175	24–44	Required clerkships in primary care specialty areas Seminars in community medicine	Clerkships—from 1 to 6 weeks (most 6 weeks)
Senior	18	2–72	2–10	Elective clerkships in medicine and surgery subspecialties, outpatient and ambulatory care, and primary care in the HMO setting	Clerkships—from 2 to 14 weeks (most 4 weeks)

students participating in a variety of ambulatory care (chiefly family practice) experiences in three clinical practice sites: a consumer-owned HMO, a university-administered HMO (that is, the George Washington University Health Plan), and the offices of fee-for-service physicians.

The costs of medical training in the consumer HMO ranged from $5 per student per day for a first-year observational experience to $112 per student per day for a second-year preceptorship with direct patient care involvement. The major costs could be attributed to fewer patient care visits resulting from the presence of the students. In the university HMO setting (that is, the George Washington University Health Plan), the results again differed from previous findings and suggested that a loss of approximately five visits per day at a cost of $82 per student per day was attributable to the same third-year required primary care clerkship as in the earlier studies. Moreover, if extrapolated to a 40-week academic year, the results from the consumer-owned HMO would suggest costs ranging from $1,000 per student year for a first-year observational experience to $22,400 per student year for a second-year, "hands-on" preceptorship in a prepaid health care setting.

Discussion

Medical schools are being encouraged to provide more ambulatory primary care experiences as a means of influencing greater numbers of graduating physicians to choose a career in primary care. At the same time, the growth of prepaid health care plans continues to be fostered by both the public and private sectors as a viable lower cost health care delivery alternative to traditional inpatient hospitalization and physician services plans. These are not new developments, and they are not likely to change soon. In light of this, medical educators, administrators, and others responsible for the planning and operation of primary care teaching programs at medical schools require a useful body of literature with respect to the nature and costs associated with the use of PHCPs as ambulatory care clinical training sites.

The findings of the surveys reported here reveal that the use of PHCPs for educational purposes is distributed throughout all four undergraduate years and is apparently on the rise. In addition to the 26 medical schools reporting formal arrangements with HMOs, 35 other schools indicated that they either planned or were seriously considering such arrangements, had ongoing ad hoc arrangements with PHCPs, or attributed not having such an arrangement to a lack of opportunities rather than to conceptual reservations.

Despite this growth in interest on the part of medical schools in associating formally with PHCPs for undergraduate training, research on the cost/benefit aspects of these associations has not kept pace. Although various PHCPs reported that they conducted internal analyses of undergraduate medical education costs, none of these studies has been published. Thus, the three George Washington University studies represent the extent of the published research found by the authors or reported by survey participants on the costs of formal undergraduate clinical training in PHCPs. These studies had inconsistent and even contradictory findings in relation to a required third-year primary care clerkship at the same HMO site. The substantial differences may largely be attributable to differences in methodologies and the excessive influence they may exert on the determination of study outcomes. More reliable cost information in this area can be compiled with the application of improved and more consistent methodologies.

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Participation in Continuing Medical Education Of General Practitioners in New Zealand

Philip M. Barham, M.B. Ch.B., and John Benseman

Abstract—Continuing professional education has become increasingly recognized as an essential element of a professional's working life. Because participation in continuing education is usually on a voluntary basis, it is essential that organizers of continuing education understand the patterns of participation among their prospective clientele. Such an understanding can help identify areas of deficiency in program provisions as well as indicate possible ways of rectifying them. The study reported here surveyed approximately one-third of all general practitioners in New Zealand on their present participation in continuing medical education (CME), their attitudes toward continuing learning, and their specific preferences for future CME programs. Although overall rates of CME participation are very high, there are nonetheless significant variations in the amount of continuing education that general practitioners undertake. The rate of CME participation appears to be linked with the general practitioner's degree of involvement in a wide range of professional activities, and those general practitioners who are only minimally involved have lower rates of CME participation.

One of the few, truly revolutionary ideas to gain prominence in recent times among educationalists is that education can and indeed should be a lifelong process. The realization that education should no longer be largely confined to the compulsory schooling sector has very extensive ramifications for most adult groups and institutions.

Within the context of work, most occupational groups now recognize explicitly that an initial training/education program is by no means sufficient to equip people adequately with the skills, knowledge, and attitudes appropriate to maintaining optimum levels of service. Rather, these initial training programs are to be seen more as learning foundations which will be continually built on and developed as a result of further education and working experience.

Because of the added impetus of the potential effects of continuing education on human life, the argument for continuing education among the health professions has often centered on the need for compulsory continuing medical education (CME) rather than voluntary partic-

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ipation. This debate has been particularly lively in the United States, where in 1977 28 of the 50 states had some form of compulsory CME for relicensure. Amid all the controversy over the desirability and/or efficiency of mandatory CME, at least two states (South Dakota and Montana) have since withdrawn CME requirements for relicensure, and several others appear likely to emulate this move.

Outside the United States, virtually all participation in CME has been on a voluntary basis. This is true in New Zealand and appears very unlikely to change within the foreseeable future.

Given the acceptance of the need for continuing education on the one hand and the voluntary participation of the clientele on the other, it is important to understand the current extent and patterns of CME participation among medical practitioners. Research of this kind not only provides an invaluable overview of the ways in which CME programs are used by practitioners but also indicates specific groups of practitioners whose needs are not met by the existing provision and possible reasons for nonparticipation. The latter point is especially important, as all forms of education provision are latently selective in some way and thereby inevitably serve sections of the profession disproportionately.

Even under a mandatory system of CME, a clear understanding of the nature of participation in continuing education can provide a valuable guideline for increasing the effectiveness of the participants' involvement in the learning process. Therefore, since participation research analyses constitute an essential first step in CME planning, the authors conducted a survey for the following purposes:

1. To identify the social and professional characteristics of the general practitioners within the designated target area for CME programs.

2. To identify general practitioners' present sources and degrees of participation in CME and to identify groups of general practitioners according to their present levels of CME participation in order to indicate possible "target" groups for future program planning.

3. To assess general practitioners' interest and attitudes toward further CME participation.

4. To identify curriculum areas general practitioners judge to be of interest and relevance for inclusion in future CME programs.

5. To gauge interest in CME and the suitability of times and various educational delivery systems used in continuing education.

In this paper, the authors report on the general findings of the study regarding patterns of CME participation, make some tentative interpretations of those findings, and suggest possible implications for future CME planning. (Findings on other sections of the report are available on request from the authors.)

Method

The target population for the survey covered all general practitioners responsible for primary health care within the University of Auckland area, which includes over one-third of all general practitioners in New Zealand. A minimum requirement of two working days per week by the practitioners was set for inclusion in the sample.

The research data were gathered in 1982 by means of two questionnaires and a formal interview. Three weeks prior to the formal interview, the authors mailed the physicians two questionnaire forms. These asked questions concerning the practitioners' preferences regarding learning methods, 87 curriculum topics, and preferred times and locations for formal CME programs. The follow-up interview carried out by one of the authors covered the following:

1. Demographic and professional characteristics—sex, age, qualifications, country of base qualification, years in general practice, hospital experience, practice in other branches of medicine, special medical interests, practice type and location, health district and practice area, base population, practice-functioning details.

2. Present patterns of CME consumption—covering formal (for example, conferences and courses), informal (for example, talking medicine with colleagues), and independent forms (for example, audio cassettes and reading); the extent of usage; assessment of interest in CME generally, and the identification of barriers to further CME involvement.

The definition of CME used in the study was deliberately broad in recognition of the variety of ways in which people learn—ranging from taking a formal course through independently reading professional literature.

As the main purpose of the survey was to understand the extent and variations of CME involvement among general practitioners, the respondents were divided into three broad categories according to an assessment of how much CME they had been involved in over the previous 12 months. The assessment included formal and independent forms of CME but did not include the more problematic informal forms. The latter were thought to be too difficult to quantify satisfactorily.

The variations in the respondents' CME involvement were then analyzed across the various social and professional characteristics mentioned previously. In this way, the analysis was able to show those variables that discriminated among general practitioners with regard to their CME participation and indicate the strength of the relationship between the variables and the behavior (CME participation).

Results

Of the 526 general practitioners identified as being eligible for the study, a total of 474 (90.1 percent) were interviewed. All interviews were carried out by one of the authors (a former general practitioner) at the respondent's office. After 169 general practitioners had been interviewed, the authors realized that some of the response categories were insufficient in some instances (for example, the amount of time spent on CME was much greater than originally envisaged) and that some significant areas of CME were not covered in the original questionnaire (for example, respondents' assessment of CME). For these reasons the interview schedule was expanded to incorporate these modifications.

The information on which this article is based is derived from the final 305 interviews. Subsequent comparison of the first 169 respondents with the other 305 respondents showed no significant variation in their characteristics or reported behaviors. Of those general practitioners not contacted (52), 12 had no telephone currently listed or had a confidential number, raising serious doubts as to their eligibility as general practitioners.

Analysis of the respondents' involvement in a range of CME activities over the previous 12 months showed that the level of continuing education activity among general practitioners generally was very high. More than three quarters of the respondents had attended at least one formal course or conference; of these, just over half (39 percent of the total) had attended two or more. Over half (56 percent) of the respondents reported daily opportunities to talk medicine with colleagues.

Twenty-six percent of the respondents were involved in some form of allied health professional conference, and 33 percent reported involvement in an educational small group (Table 1). The use of reading as a source of information and stimulus varied widely according to the type of publication involved (Table 2).

Pharmaceutical company-sponsored journals were the most widely read form of professional reading, with 86 percent reporting "moderate" or "extensive" use. Academic journals, on the other hand, were used much less, and 29 percent reported that they did not read that kind of literature at all. Textbooks were still widely used, although usually only on a limited scale. Other, special-interest journals were not read much.

Audio cassettes were increasingly used as part of the general practitioner's CME "repertoire," with over half (51 percent) of the respondents utilizing these resources. Despite the generally high level of CME involvement by a majority of general practitioners, there was still a significant number of general practitioners for whom continuing education, in any form, apparently meant little or nothing.

For the purposes of analysis, the total group was divided into three subgroups according to their CME involvement—those who had a low level of participation (39 percent of the total), a middle group with a medium level of activity (38 percent), and a third group of physicians who were very active and had a high level of involvement (23 percent).

Each of the three groupings of respondents, and especially the low and high CME groupings, was atypical of the total group to varying degrees in a number of ways. For example, those general practitioners who tended to be less active in CME included disproportionately high numbers of women (especially older); those aged less than 30 years and over 60 years; those in general practice less than six years and over 20 years; those with minimal hospital experience (1 year); those practicing less than four days per week in general practice; those in group practices with less than three others; those in solo practice; those practicing in small population areas (less than 20,000 peo-

TABLE 1

New Zealand General Practitioners' Involvement in Informal Continuing Medical Education Group Activities During 12 Months Prior to Interviews Conducted in 1982

Activity	No.	Percent
Allied health professional conferences		
Extensive	3	1
Moderate	18	6
Limited	58	19
None	226	74
Total	305	100
Small groups		
Extensive	3	1
Moderate	30	10
Limited	67	22
None	205	67
Total	305	100

TABLE 2

New Zealand General Practitioners' Use of Professional Reading Sources During 12 Months Prior to Interviews Conducted in 1982

Publication	No.	Percent
Academic journals*		
Extensive	9	3
Moderate	40	13
Limited	168	55
None	88	29
Total	305	100
Pharmaceutical company journals†		
Extensive	91	30
Moderate	171	56
Limited	35	11
None	8	3
Total	305	100
Other periodicals‡		
Extensive	4	1
Moderate	21	7
Limited	48	16
None	232	76
Total	305	100
Textbooks		
Extensive	5	2
Moderate	70	23
Limited	171	56
None	59	19
Total	305	100

* For example, *New Zealand Medical Journal.*

† For example, *New Ethicals, Modern Medicine.*

‡ For example, *Sports Medicine.*

ple); those with no night or weekend rosters but using emergency services at night; those with difficulty arranging cover; those practicing in an area more than 30 kilometers from a base hospital; those with largely out-of-date textbooks.

On the other hand, among general practitioners with high levels of CME participation, there was overrepresentation of the following groups: middle-aged males; those trained in India, Sri Lanka, and Hong Kong; those with six to 15 years of general practice experience; those practicing in another branch of medicine concurrently; those with little difficulty in arranging cover; those acting as host practitioners to trainees; those with largely up-to-date textbooks.

Discussion

Although it is debatable as to what may constitute satisfactory minimum levels of CME, voluntary CME participation among New Zealand general practitioners appears to be working adequately well, with most practitioners maintaining a reasonable level of ongoing professional education. (A fuller discussion of this area has been presented by Houle [1].) The adequacy of attendance and the quality of the educational inputs, however, can probably never reach an ultimate, or satiated, level in that there will probably always be new and changing groups and areas of need to serve. While the variations in CME participation among the different groups of general practitioners were not great overall, this study has been able to identify a number of key characteristics of general practitioners which discriminate sufficiently to show possible underlying reasons for these present variations in CME behavior.

High levels of CME activity were most clearly related to those general practitioners whose characteristics suggested they are in the "mainstream" of the profession. That is, demographically their characteristics were consistent with the dominant distributions of the profession; they were well established in their careers and yet still had considerable potential and years ahead for practicing; their practices were well organized; they had good resources and regular contact with their professional colleagues; and these general practitioners were also valued as professional models for trainees.

In contrast, general practitioners who had low levels of CME involvement could be seen as more professionally isolated members of the profession. They were more often members of one of the smaller demographic groups; they were just beginning or coming to the end of their professional careers; they had completed a minimum training; they practiced in ways (for example, less than full-time or solo) and in geographical areas that tended to isolate them from professional contact and interaction; they had poor reference resources and often had forms of practice organization that made them less available for CME.

Thus, to generalize, variations in CME participation patterns would appear to be influenced largely by the respondents' "location" within the profession. Those general practitioners whose characteristics, practice type, and organization place them in the profession's mainstream tend to be more active in their ongoing education. Those whose involvement in the profession is more isolated or peripheral have a correspondingly lower degree of CME involvement. Many others, of course, fall midway between these extremes and have a median degree of involvement in continuing education.

Because of the inherent difficulties involved in facilitating learning with reluctant participants, the authors believe it is important to attract voluntary learners into CME. While the current levels of participation are undoubtedly lower than with a compulsory CME system, it appears highly unlikely that such an alternative would produce a concomitantly higher level of learning. However, by understanding the constraints and limitations of the voluntary forms of provision currently in operation, extensions and innovations can be planned that will involve greater numbers and rates of participation among practitioners.

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Curriculum Evaluation, Education Financing, and Career Plans of 1983 Medical School Graduates
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Journal of Medical Education

Volume 59 • Number 9 • September 1984

Curriculum Evaluation, Education Financing, and Career Plans of 1983 Medical School Graduates—Maria Thomae-Forgues, Thomas H. Dial, and Robert J. Boerner 691

The Preclinical Course of Study: Help or Hindrance?—R. L. B. Neame 699

Summer Research Program for Medical Students—John P. Kemph, J. Russell Claybrook, and William A. Sodeman, Sr. 708

The Teaching of Liberal Arts in Internal Medicine Residency Training—Gail J. Povar and Karla J. Keith 714

Lessons for Teaching Cost Containment—Stephen J. McPhee, Susan A. Chapman, Lois P. Myers, Steven A. Schroeder, and Janice K. Leong 722

Teaching and Funding of Primary Care Education in Third-Year Clerkships—Isidore Berenbaum, Richard Young, Alan M. Lazerson, Peter Shaw, John McCahan, and Donald F. Taylor 730

The Use of Natural Language Entry and Laser Videodisk Technology in CAI—Abdulla M. Abdulla, Laurence O. Watkins, and John S. Henke 739

Communications: Assessing the Impact of Faculty Development Programs in Medical Education—Kent J. Sheets and Rebecca C. Henry 746

A 10-Year Review of the Utah Undergraduate Surgical Honors Program—Edward W. Nelson and Ralph C. Richards 749

The Effects of Training Medical Students To Convey Distressful Information—Mark Wolraich, Mark Albanese, Gerald Stone, James Shymansky, and Antonio Mendez 751

Improved Teaching Within a Medicine Clerkship—Martha G. Regan-Smith 753

A Problem-Based Journal Club—Bahman Joorabchi 755

Evaluation of Students' Clinical and Communication Skills in Performing a Gynecologic Examination—Wei Li Fang, Paula J. A. Hillard, Richard W. Lindsay, and Paul B. Underwood 758

Briefs 761

Editorial: Basic Science Studies: Their Purpose in Medical Education 763

Book Review 765

Bibliography 767

Letters to the Editor 772

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Curriculum Evaluation, Education Financing, and Career Plans of 1983 Medical School Graduates

Maria Thomae-Forgues, Thomas H. Dial, and Robert J. Boerner

Abstract—The Association of American Medical Colleges annually gathers data on curriculum evaluation, financing, and career plans from senior medical students through a graduation questionnaire. According to the 1983 survey, a majority of the seniors perceived that an appropriate amount of time was devoted to the various areas of instruction at their institutions. The average indebtedness of the graduates was reported to be increasing, and 84.4 percent reported having medical school debts. Only 13.2 percent of the graduates indicated plans to enter a career in research, although over one-third had some research involvement while in medical school. Those who participated in research activities during medical school were somewhat more likely to plan significant research involvement after graduation than those who were not involved in research in medical school.

Each year since 1978 the Association of American Medical Colleges (AAMC) has administered a graduation questionnaire to all U.S. senior medical students. The questionnaire has helped to provide a description of graduate medical education and career plans of senior medical students. It also has been used extensively in the evaluation of the medical school curriculum. The results of the survey are valuable to the nation's medical schools in planning program changes, to the AAMC in answering questions related to the medical school experience and future plans of medical students, and to other health policy planners in assessing the health manpower needs of the United States. The purpose of the authors of this paper is to present basic information on 1983 medical school graduates in the areas of education financing, curriculum evaluation, and career plans.

A total of 10,481 students (65.6 percent of all medical school seniors) responded to the 1983 survey. Except for a slight underrepresentation of minority group students, the respondents appear to be representative of U.S. senior medical students in general. Of the respondents, 26.9 percent were females, and 73.1 percent were males; 98.9 percent were U.S. citizens, 88.3 percent were white, and 5.6 percent came from underrepresented minority groups. Thirty-nine percent were married; 48.4 percent were single and had never married.

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Experience and Curriculum

Most of the responding seniors (77.6 percent) entered medical school directly after graduation from college; 7.2 percent entered medical school before graduating from college. Only 7.8 percent of the seniors interrupted their medical school studies for reasons other than vacations; the most commonly cited category of reasons was "personal and family," cited by 37.9 percent of those students reporting an interruption.

The seniors were asked to indicate the educational activities in which they participated while in medical school. Table 1 presents the distribution of responses to this question. The most commonly reported activities were formal specialty training (51.4 percent of all respondents) and clinical electives sponsored by another medical school (45.4 percent).

Students were also asked to rate on a scale from 1 to 3, where 1 = inadequate, 2 = appropriate, and 3 = excessive, the amount of time devoted by their institution to various areas of instruction in the medical school curriculum. Table 2 presents the ratings given by the 1983 graduates. For most of the topics listed, the majority of those stating an opinion considered the amount of instruction appropriate. The most notable exceptions were research techniques, preventive care, nutrition, medical care cost control, and practice management skills. The amount of instruction in each of these five areas was rated inadequate by more than 50 percent of those expressing an opinion.

TABLE 1

Participation in U.S. Medical School Activities by 10,481 Seniors Responding to the 1983 AAMC Graduation Questionnaire

Activity	Respondents	
	No.	Percent
Ambulatory primary care clerkship at medical school	4,233	40.4
Authorship of research paper (sole or joint)	2,190	20.9
Elective sponsored by another medical school		
Basic science	167	1.6
Clinical	4,758	45.4
Formal specialty training (subinternship)	5,387	51.4
Independent study for credit	1,465	14.0
Investigator in research project	3,578	34.1
Organized peer review of medical practice	153	1.5
Paid employment for limited clinical services	2,308	22.0
Remote clinical educational experience		
Rural community	3,089	29.5
Inner-city community	1,424	13.6
Military or other government	863	8.2
Abroad	771	7.4
Total participating in at least one of above activities*	9,748	93.0

* Not all of the students responded to this question.

TABLE 2

Percentage and Mean Score of Seniors Responding to 1983 Questionnaire Item Concerning Amount of Instruction Offered in Various Areas of the Medical School Curriculum

Curriculum Area	Rating by Percent*			Mean Score†
	Excessive	Appropriate	Inadequate	
Basic medical sciences	19.9	74.0	6.1	2.1
Behavioral sciences	13.7	63.1	23.3	1.9
Care of ambulatory patients	1.1	63.5	35.3	1.7
Care of hospitalized patients	6.6	90.0	3.5	2.0
Care of the elderly	1.8	60.0	38.2	1.6
Clinical sciences	1.3	81.8	16.9	1.8
Diagnostic skills	1.3	70.1	28.6	1.7
Drug effects and clinical pharmacology	2.3	72.9	24.9	1.8
Management of patient's socioeconomic, educational, emotional problems	4.1	49.8	46.1	1.6
Medical care cost control	0.8	33.1	66.1	1.3
Medical record-keeping skills	2.2	57.6	40.1	1.6
Nutrition	1.2	38.5	60.3	1.4
Patient follow-up	0.7	55.2	44.1	1.6
Patient interviewing skills	6.0	83.1	11.0	1.9
Physician self-evaluation and independent learning skills	0.8	57.9	41.4	1.6
Practice management skills	0.5	30.3	69.2	1.3
Preventive care	1.6	38.2	60.2	1.4
Public health and community medicine	5.0	47.3	47.7	1.6
Research techniques	4.9	43.3	51.8	1.5
Teamwork with other health professionals	1.7	80.0	18.3	1.8
Therapeutic management	1.1	72.6	26.3	1.7

* Nonresponders to each part of the question were excluded from the computation of percentages for that part. The number of respondents ranged from 10,354 to 10,413.

† Based on a 3-point scale (1 = inadequate, 2 = appropriate, 3 = excessive).

In no instructional area was the amount of instruction rated excessive by a majority or plurality of those stating an opinion.

Financing

Because of substantial increases in tuition and decreases in the availability of financial assistance in recent years, most 1983 graduates were entering their residency training with a significant amount of educational debt. Although only 29.5 percent of the responding seniors reported being in debt for their premedical education, a majority (84.4 percent) reported having medical school debts. Some 22.3 percent of the students responding to the debt question had medical school debts of $30,000 or more. Table 3 presents the distribution of premedical, medical, and total indebtedness as reported by the 1983 respondents.

Fewer than half of the responding students (45.8 percent) reported having received a scholarship from any source for their medical education. Table 4 presents the sources of the scholarships for those students who indicated that they had received one.

TABLE 3

Percentage of Seniors Responding to 1983 Questionnaire Concerning Amount of Premedical, Medical, and Total Education Indebtedness

Amount of Debt†	Percent*		
	Premedical	Medical	Total
None	70.5	15.6	13.8
$1 to $4,999	20.2	3.0	3.5
$5,000 to $9,999	7.0	6.2	6.4
$10,000 to $14,999	1.3	9.9	9.5
$15,000 to $19,999	0.5	15.8	15.2
$20,000 to $24,999	0.3	17.4	16.6
$25,000 to $29,999	0.1	9.8	10.2
$30,000 to $49,999	0.1	18.4	20.0
$50,000 or more	0.0	3.9	4.7

* Nonresponders to each part of the question are excluded from the computation of percentages for that part. The number of respondents in each category was: premedical, 10,288; medical, 10,178; total, 10,073.

† The mean debts of the indebted respondents in the three categories were: premedical, $4,167; medical, $22,694; total, $23,647.

TABLE 4

Number and Percentage of 4,731 Responding Medical School Seniors Who Indicated Receiving Scholarships by Source, 1983*

Source	Respondents	
	No.	Percent
Armed forces	574	12.1
National Health Service Corps	749	15.8
State	824	17.4
School-awarded	2,290	48.4
Foundation	962	20.3
Local charitable organization	339	7.2
Other/no source specified	476	10.1

* Forty-one of these respondents received scholarships but did not indicate the source. A total of 5,608 students indicated that they had not received any scholarship, and 142 failed to respond to the question. "Other" sources of scholarships include, for example, local medical associations and the American Medical Women's Association. Percentages sum to more than 100 because some students received scholarships from multiple sources.

Among students with debts, those who had received scholarships had a higher mean medical school debt than those who reported that they had not received scholarships ($24,115 versus $21,435, respectively).

Of the students reporting debt, those attending private medical schools had average debts of $26,535, and those attending public medical schools had average debts of $20,249. There was little difference between the average indebtedness of male students ($22,619) and of female students ($23,001). The percentages of males and females reporting any premedical or medical school debt were also similar: 81.9 percent of the males versus 82.2 percent of the females.

Residency and Career Plans

A majority of the seniors who responded to the questionnaire expected to be in a residency the first year after their graduation; 84.1 percent of those reporting their plans indicated that they planned to be in a categorical residency. When asked how many years of residency they planned to take, the largest number of those responding to the question (40.5 percent) indicated three years. Approximately 1 percent indicated that they would not be doing a residency during the first year after medical school graduation, and 55 respondents indicated that they were undecided. Table 5 presents the residency choices of those 1983 graduates who indicated they were planning a categorical or Armed Forces residency.

When asked whether their graduate medical education plans included a research fellowship, 28.4 percent of those responding to the question answered affirmatively. Of those who planned a research fellowship, 12.7 percent indicated that it would be in the area of basic medical sciences, and 43.5 percent said that it would be in clinical medicine.

Most of the students, 74.1 percent of those responding to the question, indicated that they were planning to seek certification and had decided on a definite specialty; 17.7 percent of those responding to the question (19.2 percent of those who had decided to specialize) indicated that they had not yet decided on a specialty. As in previous years, internal medicine and family practice were the most frequently selected areas of specialty certification. Table 6 shows the specialization plans of the 1983 medical school graduates who had decided to specialize and had chosen an area of specialization, along with the first specialty choices of those graduates who had definitely decided to specialize but had not decided in which area to do so.

TABLE 5

Number and Percentage of 9,302 Responding Medical School Seniors to 1983 Questionnaire Concerning Plans To Be in First-Year Categorical or Armed Forces Residency*

Residency Choice	Students	
	No.	Percent
Anesthesiology	321	3.5
Dermatology	31	0.3
Emergency medicine	167	1.8
Family practice	1,396	15.0
Internal medicine	2,693	29.0
Neurological surgery	75	0.8
Neurology	62	0.7
Obstetrics/gynecology	704	7.6
Ophthalmology	97	1.0
Orthopedic surgery	418	4.5
Otolaryngology	140	1.5
Pathology	228	2.5
Pediatrics	932	10.0
Physical medicine/rehabilitation	53	0.6
Psychiatry	353	3.8
Radiology	277	3.0
Radiology (therapeutic)	38	0.4
Surgery	1,000	10.8
Urology	107	1.2
No area specified	210	2.3

* A total of 1,179 students either indicated other plans for their first-postgraduate year or failed to indicate their plans.

A total of 109 respondents, or 1 percent of those responding to the question, indicated that they did not plan to seek specialty certification. Another 746, or 7.1 percent of those responding to the question, indicated that they were undecided as to whether they would seek certification, and 33 failed to respond to the question.

Clinical practice was the career activity of first choice for 74.5 percent of the students who indicated a first choice, with 61.6 percent choosing private clinical practice and 12.8 percent salaried clinical practice. A total of 24.7 percent planned full-time academic careers as their first choice. Table 7 presents the career choices of the 1983 graduates.

A total of 10,439 students responded to the question "How extensively do you expect to be involved in research during your medical career?" Of the respondents, only 13.2 percent indicated that they planned to be involved either exclusively or significantly (that is, several years of their career set aside for full-time research or 25 percent or more of a continuous career devoted to research pursuits). Most (78.9 percent) indicated that they planned to be only somewhat involved (one year or less set aside for research or less than 25 percent of a continuous career) or

TABLE 6

Number and Percentage of 9,593 Responding Medical School Seniors Who Indicated a Desire To Specialize, by Definite or First Choice, 1983*

Specialty	Choice				Total	
	Definite		First			
	No.	Percent	No.	Percent	No.	Percent
Allergy/immunology	12	0.2	18	1.0	30	0.3
Anesthesiology	401	5.2	34	1.8	435	4.5
Critical care	21	0.3	1	0.1	22	0.2
Colon/rectal surgery	3	0.0	6	0.3	9	0.1
Dermatology	92	1.2	35	1.9	127	1.3
Emergency medicine	211	2.7	52	2.8	263	2.7
Family practice	1,368	17.7	76	4.1	1,444	15.1
Internal medicine	982	12.7	251	13.6	1,233	12.9
Cardiovascular disease	110	1.4	165	8.9	275	2.9
Critical care	10	0.1	17	0.9	27	0.3
Endocrinology/metabolism	27	0.3	47	2.5	74	0.8
Gastroenterology	47	0.6	60	3.3	107	1.1
Hematology	19	0.2	56	3.0	75	0.8
Infectious disease	25	0.3	71	3.8	96	1.0
Medical oncology	25	0.3	48	2.6	73	0.8
Nephrology	12	0.2	32	1.7	44	0.5
Pulmonary disease	9	0.1	32	1.7	41	0.4
Rheumatology	16	0.2	26	1.4	42	0.4
Neurological surgery	85	1.1	12	0.7	97	1.0
Nuclear medicine	3	0.0	3	0.2	6	0.1
Obstetrics/gynecology	524	6.8	58	3.1	582	6.1
Gynecologic oncology	22	0.3	5	0.3	27	0.3
Maternal/fetal medicine	25	0.3	21	1.1	46	0.5
Reproductive endocrinology	42	0.5	21	1.1	63	0.7
Ophthalmology	296	3.8	41	2.2	337	3.5
Orthopedic surgery	510	6.6	30	1.6	540	5.6
Otolaryngology	180	2.3	18	1.0	198	2.1
Pathology	240	3.1	12	0.7	252	2.6
Pediatrics	501	6.5	76	4.1	577	6.0
Cardiology	19	0.2	27	1.5	46	0.5
Critical care	4	0.1	17	0.9	21	0.2
Endocrinology	2	0.0	18	1.0	20	0.2
Hematology/oncology	21	0.3	26	1.4	47	0.5
Nephrology	2	0.0	7	0.4	9	0.1
Neonatal/perinatal medicine	14	0.2	28	1.5	42	0.4
Physical medicine/rehabilitation	67	0.9	6	0.3	73	0.8
Plastic surgery	92	1.2	42	2.3	134	1.4
Preventive medicine	11	0.1	7	0.4	18	0.2
Psychiatry	327	4.2	52	2.8	379	4.0
Child	60	0.8	11	0.6	71	0.7
Neurology	113	1.5	16	0.9	129	1.3
Child	10	0.1	7	0.4	17	0.2
Radiology	24	0.3	5	0.3	29	0.3
Diagnostic	406	5.2	39	2.1	445	4.6
Therapeutic	47	0.6	4	0.2	51	0.5
Surgery	427	5.5	101	5.5	528	5.5
Critical care	4	0.1	15	0.8	19	0.2
Pediatric	27	0.3	18	1.0	45	0.5
Thoracic surgery	72	0.9	45	2.4	117	1.2
Urology	138	1.8	13	0.7	151	1.6
Did not specify a specialty	42	0.5	18	1.0	60	0.6
Total†	7,747	100.0	1,846	100.0	9,593	100.0

* The first specialty choice is given for those respondents who had decided to specialize but had not determined in which specialty area to do so.

† A total of 888 students failed to indicate whether they would seek certification, were undecided, or indicated that they did not intend to seek certification. They are not included in this table.

TABLE 7

Number and Percentage of Responding Medical School Seniors Concerning Their Choices of Career Plans*

Type of Career	Choice					
	First		Second		Third	
	No.	Percent	No.	Percent	No.	Percent
Full-Time Academic Faculty Appointment						
Basic science teaching/research	118	1.1	175	1.8	123	1.3
Clinical science teaching/research	2,446	23.5	1,351	13.6	1,399	15.3
Salaried Research Scientist						
Basic medical sciences	18	0.2	78	0.8	92	1.0
Clinical sciences	47	0.5	223	2.2	227	2.5
Private Clinical Practice						
Solo	411	4.0	381	3.8	1,104	12.0
With one other physician	1,120	10.8	2,411	24.2	834	9.1
With three or more physicians	3,684	35.4	2,012	20.2	1,200	13.1
Undecided among options	1,194	11.5	512	5.1	516	5.6
Salaried Clinical Practice						
Hospital	673	6.5	1,423	14.3	1,610	17.6
Prepaid group clinic	274	2.6	985	9.9	1,253	13.7
State/federal agency	388	3.7	358	3.6	566	6.2
Administration (no practice)	26	0.3	42	0.4	246	2.7

* The number of respondents in each category was: first choice, 10,399; second choice, 9,951; third choice, 9,170.

involved in a limited way (such as occasional cooperation with clinical trials of new drugs or medical devices).

Discussion

Respondents to the 1983 AAMC graduation survey do not appear to differ in their demographic characteristics from the senior medical school population as a whole. Therefore, it can be assumed that the graduation survey data are generalizable to the entire class.

Although more than a third of the students reported some research involvement while in medical school, only 13.2 percent indicated that they planned to be exclusively or significantly involved in research after graduation, and only 25.3 percent of those indicating their career choice chose some type of research-related career as their first choice.

Among those who reported having participated in research activities while in medical school, 25.8 percent expected to be involved in research either exclusively or significantly after graduation, while 31.1 percent expected to be involved in a limited way or not at all. By contrast, only 5.4 percent of those reporting no research activity during their medical school years expected to be involved exclusively or significantly in research, while 63.2 percent of this group expected to be involved in a limited way or not at all.

The amount of instruction given in most areas of the medical school curriculum was rated on the average as slightly less than appropriate. Despite the apparently widespread perception among medical students that the curriculum is "supersaturated," the percentage of respondents judging the amount of instruction to be excessive was larger than the percentage judging it to be inadequate in only two areas: basic medical sciences and the care of hospitalized patients. In both of these subject areas, a large majority of respondents rated the amount of instruction as simply appropriate (74 percent and 90 percent, respectively). In five of the 21 subject areas listed in the questionnaire, the majority of those giving an opinion rated the amount of instruction to be inadequate. These five areas were research techniques, preventive care, nutrition, practice management skills, and medical care cost control.

As indicated in Table 3, 22.3 percent of the graduates had medical school debts of $30,000 or more. Tuition increases and decreases in aid will continue to have an effect on the indebtedness of medical school graduates. It is expected that the average debt of medical students will continue to rise in the future.

The majority of the 1983 medical school seniors planned to be in a residency during the first year after graduation. Most graduates planned to enter private clinical practice after completing their graduate medical education.

Conclusion

The authors in this paper present descriptive information on the 1983 AAMC graduation questionnaire respondents. Because respondents did not differ significantly from medical school seniors as a group in their demographic characteristics, the data presented provide a portrait of the entire 1983 medical school graduate population.

The authors have made no attempt to provide either trend data or predictive analysis on the graduates. Information is now available on six classes of graduating seniors. Studies of changes in residency and specialty choice, indebtedness levels, and career plans are now possible. Such studies will contribute to the medical education community's understanding of how the medical school student population has changed and how it may shift in the future. More complex analyses now in progress by the AAMC under contract to the Department of Health and Human Services will make it possible to determine the effects of varying student characteristics and public policy changes (for example, implementation in 1979 of the Health Education Assistance Loan Program) on student indebtedness and career plans.

The Teaching of Liberal Arts In Internal Medicine Residency Training

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Abstract--Forty-four members of the Association of Program Directors in Internal Medicine and 58 members of the Society for Research and Education in Primary Care Internal Medicine completed questionnaires on the teaching of liberal arts in internal medicine residency programs and the importance of liberal arts to the practice of medicine. They rated economics of medical care and bioethics as essential to residency training. Law and organization of the health care system as well as economics and bioethics were rated as essential to medical practice. Although there was great variability in the curricula represented, over 40 percent of the respondents reported having formal lecture and/or seminar exposure to these topics in their programs. Problems encountered in implementing liberal arts programs included lack of curriculum time, limited faculty members, and a lack of interest on the part of residents. There is a need both to arrive at a consensus among residency directors and to explore means of developing interdisciplinary faculties if the liberal arts are to form an established part of internal medicine residency training.

The Association of American Medical Colleges (AAMC) in 1982 embarked on a three-year project, supported by a grant from the Henry J. Kaiser Family Foundation, to review and appraise the general professional education of the physician and college preparation for medicine. One concern of an 18-member panel established by the AAMC to undertake the study was the role in medical education of basic science as compared with other subjects. Steven Muller, president of Johns Hopkins University and the panel's chairman, was quoted as saying, "We should also pay more attention to the promotion of values and attitudes that physicians must have to withstand the stress of their own careers and to serve patients in a humane manner" (1).

In 1980 the Commission on the Humanities, in a report funded by the National Endowment for the Humanities (NEH), commented that the humanities must play a role in the education of all professionals who must "make so many crucial value decisions in a technological society" (2). Through NEH funding and the efforts of the Institute on Human Values in Medicine, the level of humanities teaching in medical schools, as described in a 1982 report of the institute, "Teaching Ethics/The Humanities and

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Human Values in Medical Schools: A Ten-Year Overview," increased from 12 pilot programs in 1972 to course offerings in 89 of 125 medical schools as of 1980.

Despite the trend toward the inclusion of humanities in medical school training, postgraduate medical education appears to be at a different stage of development. A 1981 conference sponsored by the Society for Health and Human Values examined the issue of humanities teaching in primary care residencies, and the conferees recommended "efforts to increase the visibility of humanities teaching in primary care" (3).

The subject of humanities education in primary care residencies raises several questions. The range of disciplines in the humanities deemed important, the appropriate allocation of time to them in an already intense learning experience, and the availability of faculty members to provide the teaching all present quandaries for program administrators. Therefore, the authors undertook a survey to learn how one group of residencies was dealing with these questions. Another goal was to develop a profile of the current activity in the teaching of humanities topics in primary care medicine residencies. A final goal was to evaluate the congruence between the perceived importance of such subjects to medical practice and their inclusion in the curricula.

Any such survey is confronted with the problem of defining the term "humanities" itself. Although such disciplines as economics and political science are not generally considered to be among the classical humanities, they represent "liberal arts" not typically associated with medical education. Because these subjects were included, this study represented a review not only of humanities but also of liberal arts education within the content of primary care medicine residencies.

Method

Program directors from both "straight"* internal medicine programs and primary care internal medicine programs were mailed or given a questionnaire on 12 topics representative of a broad interpretation of the medical humanities. The topics ranged from economics and law to literature and art. Multiple choice questions and questions rated on a Likert scale dealt with characteristics of the program, feelings about the appropriateness of liberal arts, the availability of faculty resources and expertise in the liberal arts, the value of these topics to physicians in practice, and the problems encountered in trying to include them in the curricula. The questionnaires were distributed to persons attending the fall 1982 meeting of the Association of Program Directors in Internal Medicine (APDIM). They were also sent in early 1983 to program directors listed in the *1982 Directory of Primary Care Internal Medicine Training Programs*, printed and distributed by the Society for Research and Education in Primary Care Internal Medicine (SREPCIM). Questionnaires were completed and returned by 44 APDIM members, representing approximately 36 percent of the distributed questionnaires, and by 58 SREPCIM members, representing a response rate of 63 percent.

The respondents represented a range of positions affiliated with residency programs; 50.5 percent were program directors, and 11.9 percent were department chairmen. About one-third (36.3 percent) of the respondents identified their respective programs as traditional internal medicine residency programs, another third (31.4 percent) as straight internal medicine residencies with ambulatory care exposure, 22.5 percent as primary care internal medicine, and 8.8 percent as a two-track program combining primary care and traditional internal medicine; one respondent failed to answer this question.

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* Straight and traditional internal medicine programs in general consist of 24 months of inpatient responsibilities and 12 months of elective time in internal medicine subspecialties. Primary care residencies tend to offer greater exposure to ambulatory care and noninternal medicine subspecialties, such as orthopedics, gynecology, and psychology, over the same three-year period.

As expected, the breakdown of program type differed between the APDIM and SREPCIM respondents; 36.8 percent of the SREPCIM respondents identified their program as a primary care residency compared with 4.5 percent of the APDIM respondents; and 61.4 percent of the APDIM respondents described their programs as traditional internal medicine residencies compared with 17.5 percent of the SREPCIM respondents. Despite the disparities in focus of the training experience, there were no significant differences between the two groups in their responses to the questionnaire. For this reason, responses for the two groups were collapsed and reported together.

Results

Respondents were asked to rate each of the 12 liberal arts topics on a Likert scale composed of ratings described as essential (must be in the curriculum), desirable (should be included if possible), nice (interesting but should not take curriculum time from other areas), or irrelevant (not helpful). The liberal arts topics were then ranked according to the modal response within each category from essential to irrelevant. The two topics rated as essential to residency training with the greatest frequency were the economics of medical care (56.9 percent) and bioethics (48 percent). The areas of law and medicine, medical sociology, and organization of the health care system were rated the most often as desirable. The remaining seven areas were rated as nice: history of medicine, medical anthropology, art and medicine, political science and medicine, literature and medicine, writing for medical writers, and philosophy of medicine.

The percentage of programs which offered some formal lecture and/or seminar exposure in each of the areas is presented in Table 1, together with the range of total program hours devoted to such teaching. Consistent with the respondents' feelings about the appropriateness of bioethics and medical economics to residency training, 83.7 percent of those who rated bioethics as essential and 75.9 percent of those who rated medical economics as essential responded that they included some formal exposure to those respective areas in their curricula. Formal exposure to health care law was included in the curriculum in 57.6 percent of the programs whose directors rated that topic as either essential or desirable, and the organization of the health care system was part of the curriculum in 46.3 percent of the programs whose directors rated that subject as essential or desirable. The pattern, however, was broken in the case of medical sociology, which was offered by only 28.2 percent of the programs whose spokesmen rated it as essential or desirable.

When asked to rate the value of the same 12 disciplines to medical practice on a scale ranging from essential to recreational, the respondents rated the following four the most frequently as essential: the economics of medical care, bioethics, law and medicine, and organization of the health care system. No other topics were deemed essential by a modal group of respondents. Not surprisingly, 93.9 percent of those who felt bioethics was essential to training and 93.1 percent of those who felt medical economics was

TABLE 1

Distribution of Formal Liberal Arts Subjects Taught in 102 Internal Medicine Residency Programs, 1982–83

Subject	Percentage of Programs Including Topic	Range of Hours Devoted to Topic Over Three Years
Economics of medical care	64.7	1 to > 100
Bioethics	61.6	1 to > 100
Law and medicine	48.0	1 to 20
Organization of health care system	42.0	1 to > 100
Medical sociology	19.8	1 to 90
Literature and medicine	19.6	1 to 36
History of medicine	8.8	1 to 50
Writing for medical writers	7.8	2 to 12
Philosophy of medicine	6.9	1 to 36
Medical anthropology	4.9	2 to 40
Art and medicine	2.9	2 to 5
Political science and medicine	2.0	1 to 40

essential responded that exposure to these areas was also essential to medical practice. However, only 63.5 percent of those who identified medical economics as essential to practice also felt that teaching in that area was essential to medical training. This same pattern of response also applied to two other subjects: law and medicine and organization of the health care system. Despite the apparent discrepancy, the majority of programs whose spokesmen identified the above four topics as essential to practice did offer some formal teaching in those areas during residency training. Of those programs whose spokesmen identified knowledge of medical economics, bioethics, law and medicine, and the organization of the health care system as essential to practice, 71.8 percent, 75 percent, 65.6 percent, and 52.5 percent, respectively, offered some formal exposure to these topics within their curricula.

The respondents of residency programs in which some formal teaching in the liberal arts occurred were asked to describe their impressions of their residents' interest in the topics covered on a scale ranging from very receptive to uninterested. There was no topic for which the modal response was "very receptive." With the exception of medical sociology, the topics in which residents were thought to be "moderately interested" were generally those rated with greatest frequency as essential or desirable by the respondents, that is, law and medicine, economics of medical care, organization of the health care system, and bioethics. The receptivity of residents to the remaining eight areas was described as "neutral."

Information was also gathered to help develop a profile and description of efforts to integrate the teaching of the medical humanities and liberal arts subjects into residency training. As noted, Table 1 shows the percentage of programs which offered some formal lecture and/or seminar exposure in each of the liberal arts areas included in the questionnaire. Of the 12 topics, those most often included in residency curricula were the economics of medical care (64.7 percent), bioethics (61.6 percent), law and medicine (48 percent), and organization of the health care system (42 percent). Yet the amount of time devoted to teaching in these areas varied from one to more than 100 hours over the course of the three-year training program. Fewer than 20 percent of the sample programs offered formal exposure to any of the remaining eight topics.

Based on responses from the 69 programs which did offer some formal teaching in the medical humanities, it appeared that the responsibility for teaching in these areas varied greatly from program to program and was generally spread among more than one person or group. The most frequently cited teaching resource, noted by 71 percent of the respondents, was the residency program's own medical faculty, including part-time and volunteer faculty members. Some 56.5 percent of the respondents reported the use of multidisciplinary faculty members, including hospital and group practice administrators, ethicists, and faculty members in behavioral science. Moreover, 39.1 percent listed the use of guest lecturers and visiting faculty members and speakers from outside groups, such as government agencies, local medical societies, private organizations, and departments of continuing medical education. In four (5.8 percent) of the programs, the representatives noted that residents took responsibility for teaching humanities.

To assess the depth of faculty resources, the authors asked the respondents to describe the faculty members available to their programs in terms of accessibility and expertise. The respondents selected from the following descriptions: extensive (resources available for current needs and future development); sufficient (resources available for current needs but would need more for future development); insufficient (insufficient resources for current needs and future development); and unavailable (resources unavailable for current needs or future development). None of the respondents rated their program's faculty resources as extensive in any of the liberal arts areas. The respondents did rate their available resources as sufficient with greatest frequency in the area of economics (54.5 percent), bioethics (45.8 percent), law (45.4 percent), literature (36.3 percent), and organization of the health care system (51.5 percent). Faculty resources available in the remaining seven areas were described as insufficient. Another question asked the respondents to indicate whether they obtained their instructors from one or all of the following: the residency program faculty, the medical center faculty, the affiliated university faculty, or the community. It appeared that no one source was prominent in providing faculty members in the liberal arts. In fact, the residency programs appeared to have similar patterns in obtaining liberal arts instructors, with 64.6 percent drawing from their own residency program, 64.6 percent from the medical center, 60.6 percent from an affiliated university, and 53.5 percent from the community.

Lastly, the respondents were asked to identify any particular problems they had encountered in integrating topics they perceived as essential into their curricula. Fifty-six identified a total of 100 problems, which were grouped into the 11 categories that are listed in Table 2. Lack of time in the curriculum emerged as the most frequent problem, reported by 66.1 percent of these respondents. Constraints on staff time and a lack of interest on the part of residents were reported by 23.2 percent and 25 percent of the respondents, respectively. Additional problems revolved around the lack of qualified teachers, developed curriculum, funding, and proven teaching methods. Several respondents noted difficulty with motivating faculty members and accommodating the specific interests of each group of residents.

TABLE 2

Percentage of 102 Internal Medicine Residency Programs Reporting Problems in Efforts To Incorporate Liberal Arts Subjects into Curriculum, 1982–83

Problem	Programs with Problem
Lack of curriculum time	66.1
Residents' lack of interest	25.0
Lack of staff members' time	23.2
Lack of qualified teachers and/or curriculum planners	19.6
Lack of funding	12.5
Lack of resources (unspecified)	7.1
Identification of effective teaching methods	7.1
New program	5.4
No developed curriculum	5.4
Difficulty motivating faculty members	5.4
Changes in interests of each group of residents	1.8

Discussion

The results of the survey reported here showed that at least certain topics within the broad rubric of liberal arts disciplines were considered by the respondents to be both essential to medical practice generally and important for residency curricula in particular. The responses in these two areas of observation were not fully concordant. That is, substantially more respondents felt that economics and bioethics were essential to practice than considered them essential to internal medicine residency training.

Several explanations might be offered for this apparent discontinuity between belief and application in the internal medicine residencies that were studied. First, program directors may be hesitant in assigning the teaching of such topics to the residency level; medical undergraduate training may be perceived as a more appropriate focus. Second, as in undergraduate education, the pressure on curricular time in residencies is great. The respondents to this survey may have felt that, though essential to practice, the subjects simply would have to be "picked up" by residents on their own. Third, experience in teaching these topics within the context of internal medicine residencies is limited. Several published articles on family practice have described teaching efforts in ethics, for example, but overall there are few role models for teaching liberal arts in medical residencies to which current faculty members can comfortably refer (4–6). Thus, apprehension about how to go about introducing a subject area effectively may be reflected in a reluctance to consider it essential to the curriculum.

Finally, selecting from among the myriad of liberal arts subject areas may be seen as a matter of personal preference tempered by experience—hence, the possible unwillingness of residency directors to impose particular themes within the curriculum. Most likely, a combination of some or all of these factors are at work in the discordance revealed by the study data.

Another finding which raised questions was a perceived lack of interest in the liberal arts on the part of the residents themselves. At best, program faculty members considered their residents to be only moderately interested in several of the subjects. It is easy to speculate that the possibility of a lukewarm reception may have deterred some faculty members in their efforts to introduce the liberal arts into residency training. In fact, difficulty in attracting residents to conferences on these topics was cited by Dr. Susan Day of the University of Pennsylvania at a May 1983 workshop sponsored by the Society for Research and Education in Primary Care Internal Medicine. The demands on residents' time placed by clinical tasks and by attendance at more traditionally accepted lectures may work against the success of introducing liberal arts into the program. Interest on the part of residents may, therefore, have to be enhanced by such efforts as providing a free lunch at a lecture on the liberal arts if the faculty members decide that exposure to the liberal arts, or some subset of them, is essential.

This study suggests other potential impediments to the development of liberal arts curricula in internal medicine residencies. A lack of available faculty members is one obvious problem. Although spokesmen for many of the residencies considered their resources adequate for their current effort, a vast majority were not equipped to expand. The fact that some residencies offered only one hour while others could offer over 100 hours in the same discipline suggests the possibility that many residencies might encounter difficulties were a consensus to arise favoring more rigorous and lengthy exposure to the humanities. The related issues of faculty development and funding must be dealt with if internal medicine residencies are to commit themselves to training in the medical humanities and related liberal arts subjects.

Based on the survey responses, the authors have attempted to describe the nature of training in the liberal arts in a sample of internal medicine residencies. As might have been expected, there existed ambivalence in the respondents' feelings about the importance of liberal arts and enormous variability in the teaching of these subjects in the residency programs. Yet, just as there is a push to "promote understanding of values and attitudes" at the undergraduate level, so residencies will need to place more emphasis on liberal arts subjects. The clinical intensity of the residency experience, it would seem, requires nurturing of efforts which might help residents to grapple with the value conflicts inherent in medical practice.

Internal medicine residencies, like medical schools, are faced with several challenges concerning the liberal arts. Further studies and efforts are essential to achieve a consensus among residency directors about what aspects of the liberal arts should be taught. There is need to address the question of whether those subjects considered essential to the practice of medicine, such as bioethics, economics, law and medicine, and organization of the health care system, need to be introduced into residencies. If residency directors determine that certain of these subjects need not be taught in this context, the reasons for such a decision may need to be identified. The present study revealed that even agreement among residency directors to teach liberal arts may raise new questions. The enormous variability among programs also raises issues of how much standardization of curricula can or ought to be achieved.

The liberal arts activity in some residency programs suggests that there is indeed experience upon which to draw. The sharing of curricula and syllabi among the residency programs and the development of pertinent continuing medical education programs could enhance the development of faculties to teach liberal arts. Conferences sponsored by the Society for Health and Human Values and efforts on the part of the American Board of Internal Medicine to identify and evaluate the humanistic attributes of candidates for certification, among other efforts, should help stimulate the development of liberal arts teaching within residencies. Residency program directors should be able to introduce the humanities and liberal arts to moderately interested residents with no more hesitation than teaching the traditional aspects of clinical medicine.

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Health Care Institutions: Survival in a Changing Environment
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Volume 59 • Number 10 • October 1984

Health Care Institutions: Survival in a Changing Environment—Karen W. Tyson and Jeffrey C. Merrill 773

Changes in the Concept of Informed Consent in Medical Encounters—Rachelle D. Hollander 783

The Influence of the Attending Physician on Indirect Graduate Medical Education Costs—Katherine R. Jones 789

Clinical Competence Certification: A Critical Appraisal—James O. Woolliscroft, Jeffrey K. Stross, and Joseph Silva, Jr. 799

Changes in Life-Style Characteristics, Health, and Mood of Freshman Medical Students—Thomas M. Wolf and Grace E. Kissling 806

Reduced-Schedule Pediatric Residency Training—Eric A. Schaff and Robert A. Hoekelman 815

Communications: Academic Origins of Medical School Applicants and Entrants, 1980–1982—Gwendolyn L. Lewis 825

- **Concordance of Medical School Course Grades and NBME Parts I and II Examination Subject Test Scores**—Janice P. Murphy, G. Craig Rosevear, and Nancy E. Gary 828
- **Faculty Development in Family Medicine: A Survey of Needs and Resources**—S. R. Frisch and Yves Talbot 831
- **Cost of Residents' Decisions on Actual Patients and in Simulated Encounters**—Robert E. White, Barbara B. Quimby, Betty J. Skipper, and George D. Webster 833
- **Educational Value of an Ambulatory Care Experience for Medical Students**—Cynthia B. Dutton, Miriam Friedenthal, Curt Deno, Susan Bane, and Carol B. Seitz 836
- **Failures in Comprehensive Diagnosis by Senior Medical Students**—Solomon Yusim, Carlos Vallbona, Valory Pavlik, Steve Sanford, Anna Baron, and Joseph Merrill 838
- **A Simple Hypnotic Approach To Treat Test Anxiety in Medical Students and Residents**—Stephen W. Hebert 841
- **Faculty Perceptions of the McMaster M.D. Program**—R. G. McAuley and C. W. Woodward 842

Editorial: Changes in Informed Consent: How Far and How Fast? 844

Bibliography 845

Letter to the Editor 848

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Health Care Institutions: Survival in a Changing Environment

Karen W. Tyson, Ph.D., and Jeffrey C. Merrill

Abstract—The health care system in the United States has been altered by recent economic and political events, including a major recession and a retrenchment in federal nonentitlement spending programs. The economic recovery and the continuing high federal deficits prompt new questions about both the future expansion and the distribution of health spending. Long-term economic forecasts and public opinion polls suggest that health will consume a growing share of the national resources. Nevertheless, the level of health spending will not grow as rapidily as in the past, and the distribution of that spending may also change. Because of these changes, the growth in health spending will not guarantee the survival of existing institutions. New competitive forces and revised reimbursement mechanisms will lead to a redistribution of the health dollar, and this redistribution will create both risk and opportunity for America's important health care institutions and their health professionals.

The health care system in the United States is undergoing rapid changes. If health care institutions are to survive, they must be aware of these changes and their implications. To describe and understand the future, economic developments and forecasts, opinion polls, and existing and proposed legislative and regulatory changes must be followed and analyzed.

There are several reasons why these disparate elements are important. The general economic climate (prosperity, inflation, recession) affects the degree to which businesses can afford to provide health care protection and individuals can pay for their own care. The rate of growth of the gross national product (GNP) is a measure of how much the health sector can expand without diminishing the resources available to other sectors of the economy. Additionally, the proportion of the GNP spent for health care has been viewed as a symbol of health care's growing influence on the economy and, in turn, the economy's capacity to support further expansion in health care. Lastly, health care institutions need to understand the forces influencing the rate of inflation, since inflation affects the costs of the goods, services, and labor which these institutions purchase.

Public opinion is also important. Polls can show where "health" falls in terms of national priorities, whether the public perceives a crisis in health costs, and

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where the public stands on specific programs and proposals. An examination of polls that ask the same questions every year is particularly useful in determining whether there are major shifts in public opinion that are likely to alter the political environment.

Finally, changes in public policy must be considered. First, federal spending for health, which represents 10 percent of total federal outlays, is the only area of the federal budget besides defense and income security (that is, Social Security, other federal retirement programs, and welfare) that could be cut enough to make a major difference in the deficit. Accordingly, health programs in the federal budget have become a target for those who believe that high deficits damage the economy and hamper economic recovery. Second, future changes in the laws and regulations governing federal and state health programs, such as Medicare and Medicaid, will affect how institutions manage resources. Third, those same government actions with respect to health programs also have an effect on the private sector.

Forecasts for the 1990s

The Center for Health Policy Studies at Georgetown University in Washington, D.C., has developed a model to forecast several components of health spending in the United States.* Several levels of health spending are forecast, including (*a*) total health spending, which includes all spending for the health care of individuals regardless of the source of payment, government public health activities, administrative costs such as the net cost of health insurance, medical research, and construction of health facilities; (*b*) personal health care spending, a narrower measure that includes only spending for personal health care—such as spending for hospital, nursing home, home health, physician, and dental care; care provided by other health professionals; eyeglasses; medical appliances; and prescription drugs—and omits public health, administration, research, and construction costs; (*c*) spending for hospital care from all sources of payment—government, insurers or other third parties, and the individual; (*d*) spending for physician services from all sources of payment.

The model, using assumptions discussed below, forecasts that total health spending will reach $1.9 trillion (13.8 percent of the GNP) in 2000, up from $322 billion (10.5 percent of the GNP) in 1982. Total health spending will increase at an average rate of 10.3 percent per year between 1982 and 2000, while spending for hospital care will grow an average of 11 percent per year. Expenditures for physician services will grow at an average rate of 9.9 percent per year. Total health spending will also rise substantially in real terms (that is, after accounting for inflation): 4.7 percent per year between 1982 and 2000 (Table 1).

The model on which these forecasts are based emphasized supply factors as the major determinants of health spending. The supply of hospital beds, the supply of medical specialists relative to population, and real construction spending for health facilities were used to forecast total health spending, personal health care spending, and spending for hospital services. The supply of physicians relative to population, physician prices, and health insurance coverage were used to forecast spending for physician services. The importance of supply factors as determinants of health spending is corroborated by the authors' own research and by a

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* Technical details of the forecasting model are available from the authors.

TABLE 1

Forecasts of Health Care Spending in the United States, 1982–2000, According to Center for Health Policy Studies

Spending Category*	Spending (Dollars in billions)			Average Annual Real Rate of Growth† (In percent)	
	1982	1990	2000	1970–1982	1982–2000
Total health expenditures	322.4	744.6	1,880.2	5.5	4.7
Personal health care expenditures	286.9	665.7	1,685.7	5.7	4.7
Expenditures for hospital care	135.5	332.2	883.9	6.6	5.3
Expenditures for physician care	61.8	133.7	336.4	5.5	4.3

* For definitions, see text.

† Inflation is measured by gross national product deflator.

recent study by McLaughlin and colleagues that found supply factors more important than regulatory or competitive conditions in explaining variations in spending for hospital care in local areas (1). The projections in the present paper are based on the assumption that the rate of inflation, as measured by the GNP deflator, will be 4.9 percent per year between 1985 and 1990 and 5.6 percent per year between 1990 and 2000. (The GNP deflator is a more comprehensive measure of inflation than the more familiar Consumer Price Index (CPI) and reflects the components of the health sector better than the CPI. In addition to consumer goods, this deflator also includes inflation in capital goods and in government production.) These rates of inflation are down somewhat from inflation during the 1970's (6.9 percent per year). It is also assumed that the real gross national product (adjusted for inflation) will grow approximately 3 percent per year between 1985 and 1990 and 2.7 percent per year between 1990 and 2000. The economic assumptions are within the range of most private forecasters and the projections of the Social Security trustees (2).

Real health spending, according to this analysis, will grow substantially faster than the GNP (Figure 1). Thus, the analysis points to continuing expansion of the health sector, even relative to the expected growth in the rest of the economy.

Economic and Political Factors

A forecast of continued expansion in the health sector may be surprising considering current developments. The furor over the recession, corporate concerns about high health care costs, and anxiety over the Medicare cost crisis imply that the health sector may actually shrink in the future. Thus, a statistical forecast should be examined in light of the less quantifiable economic and political forces influencing the health sector. However, even given such an examination, the economic and political climate does not argue for any revisions in the statistical forecasts made here.

First, the state of the economy will not act as a deterrent to the expansion of the health care sector. Even during the worst recession since World War II, health care spending still increased at double-digit levels during 1981 and 1982. Health spending has become a major force in the economy. The nearly six million people employed in the health care business, capital investment valued at over $110 billion for community hospitals alone, and the numerous other industries serving the

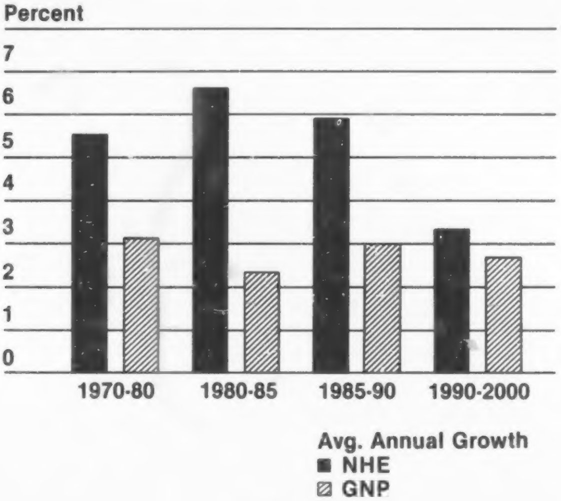

FIGURE 1

Growth in total real national health care expenditures (NHE) compared with growth in real gross national product (GNP), according to forecasting model of the Center for Health Policy Studies, 1970–2000.

health sector all contribute to a $350-billion industry so vast that it has a momentum of its own (3, 4). The same businesses that are concerned about their own health costs often have a stake in supplying the health industry. Investors favor the health industry for its growth possibilities, not for its ability to contain costs. State and local governments that have issued bonds to expand hospitals are concerned that these hospitals have enough revenue to pay off the bonds. Thus, with major corporations, the stock and bond markets, and city and state governments holding economic stakes in the current system, aggressive action to restrain its growth is unlikely.

Moreover, the crisis in health care costs reported in the news media has not led to a great public outcry to control costs. Rather, public attitudes toward the health care system remain shifting and often contradictory. For example, there was a conservative tide in the late 1970s, when concerns over inflation, crime, and other "conservative" issues were mentioned by respondents more often than such "liberal" concerns as high unemployment. Recently, that trend was reversed (Figure 2). It should be noted that more "liberal" periods are associated with a public preference for greater government spending. In addition, despite changes in the public's overall attitudes on political matters, the public continued to believe that health care was an important national priority—more important than the environment, urban problems, defense, racial equity, or welfare (Figure 3).

Public opinion is particularly contradictory when the public's opinion of the health system in general is compared with its views on its own medical care and expenditures for health. While two-thirds of Americans believe that the health care system requires either fundamental changes or complete restructuring (5), a majority of the persons polled report

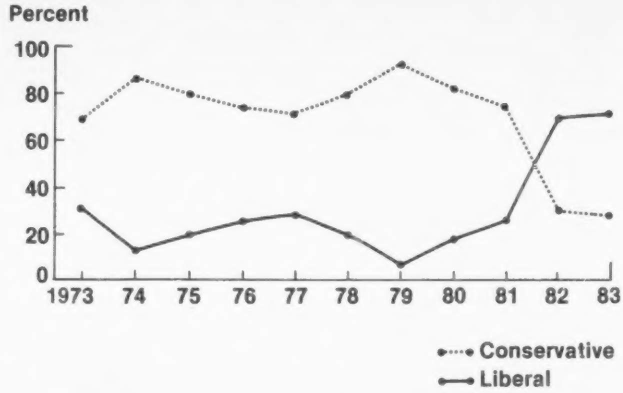

FIGURE 2

Percent of respondents identifying "liberal" versus "conservative" concerns when asked to identify the United States' most important problem, 1973–1983 (based on annual Gallup polls, 1973–1983).

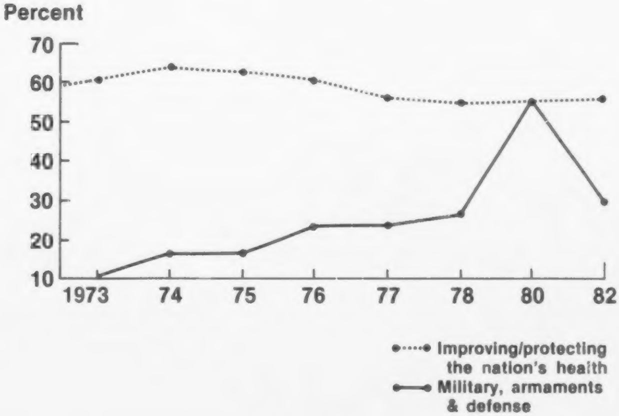

FIGURE 3

Percent of respondents believing that the federal government spends too little on "improving and protecting the nation's health" and on "the military, armaments, and defense," 1973–1983 (source: reference 11).

complete satisfaction with the out-of-pocket cost of their own medical care (6). Further, while there is some support for national health insurance for the unemployed (59 percent favor a program similar to Medicare), this support evaporates if it means that people would pay higher taxes or insurance premiums to cover the cost (53 percent oppose paying more). Thus, there does not appear to be any unified outcry either for a reversal in the growth of the health system or for more growth.

The future political environment contains competing forces which are likely to offset each other; thus, legislators are unlikely to force a contraction in the size of the health care system. Because cutting programs such as Medicare and Medicaid involves explicitly removing benefits to which the beneficiaries are legally entitled, it is much more difficult politically to make major changes in them. In addition, public opinion does not appear to support further cutbacks in discretionary health spending. There is a high correlation between the percentage of the public that believes the nation is spending too little on health and real federal spending on discretionary health programs (Figure 4). Based on this comparison, possible support for an increase in health spending rather than a decrease can be seen.

If the record of the past few years is any indication, effective action to reduce the rate of growth of health spending, whether in the political arena or in the marketplace, is unlikely. The new Medicare system of prospective hospital reimbursement by diagnosis related groups (DRGs) will probably not reduce health spending substantially. Hospitals will quickly learn how to use the system to maximize reimbursement. In addition, any reduction in cost to the federal government as a result of the DRG plan may merely be shifted

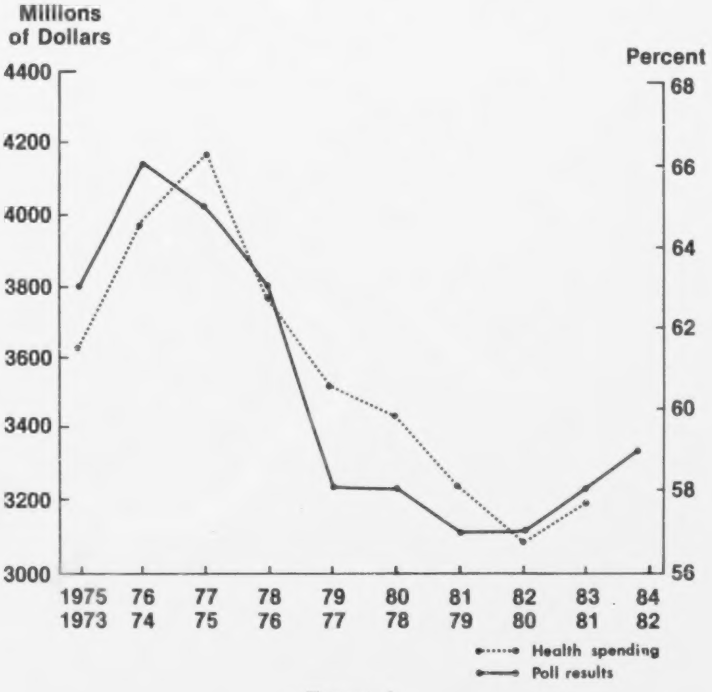

FIGURE 4

Real spending on discretionary health care programs by the federal government compared with the percent of respondents saying (two years earlier) that the nation spends too little on health care, 1975–1984 (the top row of years refers to government spending and the bottom row to the public opinion poll; sources: reference 11 and annual editions of *Budget of the United States Government).*

to other payers or result in other forms of care. Even the substantial threats to the future solvency of the Medicare program are being met by proposals from the Advisory Council on Social Security and Congress to raise taxes or force beneficiaries to pay more rather than to cut benefits.

There are, however, some factors competing against the tremendous momentum of the health care system. These will not arrest the growth but, as the authors' projections indicate, are likely to reduce it below historical levels. For example, corporations are concerned about their own health care costs, and unions have less bargaining power than in the past. Thus, corporations are likely to look to alternative systems such as preferred provider organizations (PPOs) or to encourage greater use of health maintenance organizations (HMOs). Employees are also likely to be required to pay more through higher premium shares, deductibles, and coinsurance.

In addition, the projected increase in the number of physicians will have an effect on the marketplace. The need to compete for patients may force physicians to consider salaried positions or preferred provider arrangements which would have been unacceptable to them in the past and will possibly contain costs by lowering fees or reducing hospitalization. Nevertheless, so far, physicians are finding ways—such as the use of advertising and other marketing techniques, increased testing and consultations, increased preventive care, and billing separately for as many services as possible—to avoid reductions in their income (real net income for physicians actually increased in 1982).

Finally, concerns over the federal deficit may result in some reduction in the growth of federal health spending. If the new Medicare payment system fails to generate savings for the federal government, other cost-containing measures may be instituted. In any event, the government is unlikely to launch any new initiatives to cover other populations or to expand benefits without strict cost controls.

Thus, economic and political factors appear to be either supportive or neutral toward future expansion of the health care system. However, as discussed below, these factors may point toward changes in how spending is distributed.

Academic Health Centers

On the surface, the authors' forecasts represent good news for health care institutions. The health sector will indeed continue to expand, although not as rapidly as in the past. However, how health dollars will be spent and who will get them is likely to change. Thus, planning is critical if health institutions are to flourish in a changing environment.

Changes are already apparent. First, support for academic health care institutions in the forms of state and local subsidies, federal research grants, tuition, and fees is undergoing changes. Second, the attempts of medical schools to meet declines in direct support by increasing medical service revenues make them particularly vulnerable to changes in the structure and financing of health services.

While overall government spending for health will continue to grow, the areas and the sources of increased spending are not necessarily those likely to benefit traditional health care institutions such as academic health centers. Given the growing burden of providing services to individuals as a result of Medicare, Medicaid, and Veterans Administration programs, the federal government cannot be relied on to fund new investment in health institutions. Discretionary funding for health services has already been cut substantially, and there is no reason to expect a reversal of this trend. The best that academic health centers can hope for is a leveling off in such spending.

The decrease in discretionary spending will manifest itself in a number of ways. For example, the concern over an expected oversupply of doctors is ending sources of direct discretionary funding for medical education (for example, capitation grants). As part of that same trend and in response to the funding crisis in the Medicare Trust Fund, direct and indirect support for medical education through third parties may become more restricted. Also, there is some question about how far tuition can be raised to provide continued support. In 1983 alone, the average tuition went up by 18 percent (7).

Many academic health centers are already beginning to respond to these changes by relying less on traditional funding sources and more on reimbursement for patient care. According to an American Medical Association (AMA) survey, U.S. medical schools received 29.7 percent of their revenues from medical service in the 1981-82 academic year, up from 12.2 percent in 1970-71 (7). Financing through patient care revenues will become increasingly important to the medical schools in the years ahead.

In the area of research, where the federal government has been a major source of support for academic medical centers, the picture is much the same. An unpublished study by the authors of the present paper indicates that federal support for research and development in the health field will grow only slightly faster than the rate of inflation, at about 5.9 percent per year between 1982 and 1990. However, industry support for health research and development over the same period will grow at an average of 12.3 percent per year, and industry will be a larger funder in this area than the federal government by 1990. Industry support of university-performed health research and development grew by a substantial 17 percent per year between 1974 and 1982 (8, 9). (This shift in funding implies that basic health research will decrease, while applied research will expand.)

Private foundations, which also have been a major source of funding for investment in health care in the past, are already slowing the rate of that investment. Foundation spending in the health field grew only 5.1 percent per year between 1975 and 1980, considerably less than the rate of inflation (10). This trend will also probably continue in the future.

Access to capital for renovation and expansion of facilities may become more difficult. Debt financing already represents a growing source of funds for plants and equipment. Over the last five years, borrowing has risen from 6 percent to 16 percent of funds obligated for capital assets (7). Hospitals will increasingly be forced to compete in the bond market against the vast borrowing needs of the federal government and against other industries that will want to expand if the recovery becomes more secure. Further, limits on capital reimbursement under Medicare are scheduled for 1986, a time when hospitals may need to renovate facilities that were built during the 1950s and 1960s when the Hill-Burton program stimulated hospital construction.

Other payers may also limit either overall capital spending or the amount of debt financing. Thus, institutions (particularly proprietary facilities) with sufficient equity to finance expansion will clearly have an edge.

Also foreseen are major changes in the

structure of the health care delivery system. The "corporatization" of health care is proceeding at a quick pace. For example, the DRG system of reimbursement in the Medicare program creates a whole new system of incentives that are attractive to for-profit institutions. Academic health centers will find themselves competing with proprietary hospitals that believe they can now be profitable in some of the areas that were considered the private domain of teaching hospitals. For example, bypass surgery, which has a high DRG price, may prove to be very profitable for private institutions, which will then compete with teaching hospitals for those patients. Alternative delivery systems, such as HMOs and PPOs, set up to cut costs and/or realize profits will compete for patients. Competition, whether effective in containing costs or not, will nevertheless affect the role and market share of academic health centers.

The growth in the physician population may not lead to the competition—and resulting lower price—that some hope for. Indeed, there is every reason to expect a continued rise in expenditures for physician services. However, the distribution of expenditures will change, as will the relationships between physicians and health care institutions. That is already apparent in the growth of independent urgent care centers as well as in the development of ambulatory "surgicenters." In addition, shifting will occur in how spending on physician services is allocated among specialist groups, between younger and older physicians, and between independent practitioners and those who remain hospital-based.

Moreover, there is an increasing movement away from the hospital as the centerpiece of the health care system. Prospective payment and concern over costs in general are leading to more emphasis on getting people out of the hospitals and into nursing homes and home health care. Thus, very few traditional institutions will survive by refusing to change. While these changes may not dramatically alter overall health expenditures, they will certainly redistribute the funds that are spent.

Present and expected developments suggest that the remainder of this decade will be a period of instability and challenge to America's medical institutions. The winners are likely to be those that can respond rapidly in terms of emphasizing additional services, that have access to capital, that can find growing sources of funding such as private sector research grants, and that are able to select patients and physicians according to specific marketing and revenue objectives. The losers are more likely to be institutions that cannot shift costs from Medicare and Medicaid to private insurers because of their disproportionately small share of privately insured patients, those that continue to rely on traditional sources of support—such as government operating subsidies, federal research grants, and tuition and fees—for education and research, and those that cannot respond quickly and aggressively to changes in the health care marketplace. Keeping one step ahead of the changing environment is the most likely way medical institutions can survive and benefit from the continuing expansion of the health care sector.

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COMMUNICATIONS

Academic Origins of Medical School Applicants And Entrants, 1980–1982

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The national marketplace for medical personnel is currently affected by changes in both the demand for and supply of physicians. An oversupply is projected in some specialties, while a continued need is anticipated in others, but primarily in geographic locations previously not popular with physicians. Under these circumstances, the recruitment to the profession of a sufficient number of highly qualified candidates from diverse backgrounds is a concern shared by many in medical education. This concern focuses attention on the current suppliers of medical school students and their capacity to furnish well qualified candidates.

Medical school admissions information by broad classes of undergraduate institutions has not been readily available. An article in the *Journal of Medical Education* (1) named the undergraduate institutions supplying the most first-year medical students and having the highest entrant/applicant ratios in 1973. Although this information was useful, it did not present a complete picture. Since then no further studies have been reported.

In the present article two aspects of the national marketplace of medicine—the academic origins of candidates for medical careers and the success of different types of institutions in placing candidates in medical schools—are assessed. Information for the three most recent years from two sources are merged: Association of American Medical Colleges data on the applicants and matriculants at U.S. medical schools from U.S. undergraduate institutions in academic years 1980, 1981, and 1982, and National Institute of Independent Colleges and Universities data on institutional characteristics for academic years 1979, 1980, and 1981, including individual Carnegie Commission on Higher Education classifications of undergraduate schools and yearly graduation figures. Colleges and universities are designated as belonging to a particular Carnegie Commission category on the basis of the structure of the institution, the numbers and types of schools and degrees granted, and the institution's degree of selectivity in choosing entrants (2). Two-year and foreign institutions named as the primary ones attended by applicants were deleted from study. The remaining institutions constituted 88.6 percent of those named by medical school applicants and represented 97.2 percent of the applicants to medical school in the three years.

Undergraduate institutions are categorized by the Carnegie Commission as follows: Research Universities I (the 50 leaders in federal support, awarding at least 50 doctorates a year); Research Universities II (the next 50 leaders in federal support or among the 60 leaders in Ph.D.s awarded); Doctoral Granting Universities I (others awarding 40 or more doctorates in at least five fields or receiving $3 million in federal support and producing 20 doctorates in five fields); Doctoral Granting Universities II (others awarding at least 20 doctorates or 10 doctorates in at least three fields); Comprehensive Colleges and Universities I (other institutions offering a liberal arts program and at least two professional or occupational programs and enrollment of at least 2,000 students); Comprehensive Colleges and Universities II (the remaining institutions with a liberal arts program and at least one profes-

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sional or occupational program, enrolling, if private, at least 1,500 students and, if public, at least 1,000 students); Liberal Arts Colleges I (colleges with a liberal arts program only and with an estimated average combined SAT score above 1,030); Liberal Arts Colleges II (other liberal arts colleges); Professional Schools and Other Specialized Institutions (those with specialized primary purposes and located on self-contained campuses); and Nontraditional Schools (those not otherwise classified, usually without a campus).

Results

The academic origins of all bachelor's degree recipients and of applicants and entrants at medical schools are given in Table 1. Six institutional types together supplied 64.9 percent of the bachelor's degrees, 69.3 percent of the applicants, and 70.8 percent of the medical school entrants: public and private research universities I, public and private comprehensive universities and colleges I, public research universities II, and private liberal arts colleges I. While medical school applicants and entrants came from all types of undergraduate academic backgrounds, the relative contributions of each varied considerably. Private institutions, particularly the research universities I and II and liberal arts colleges I, provided disproportionate numbers of both applicants and entrants when compared with the numbers of bachelor's degrees awarded by these institutions.

One measure of how successful different types of institutions are in placing their students is the percentage of their applicants matriculating in medical school. For the three years studied, that percentage was 46.8 for all institutions. It was generally higher for private than for public undergraduate institutions. The top rates were found in private research universities I and II and in private liberal arts colleges I (61.8, 54.0, and 52.1 percent, respectively). All other types of institutions had rates below 50 percent. To further control for size differences among the Carnegie Commission types, the author compared the ratio of medical school matriculants in the three years to the bachelor's degrees conferred in the three preceding years at each type of undergraduate institution. Overall, matriculants were 1.8 percent of the bachelor's degree recipients. Again, private schools produced proportionately more than public schools. Higher medical school matriculation rates occurred mainly from the private undergraduate institutions with the same three leaders (8.4, 5.9, and 4.7 percent, respectively). The average rate of success was less than 3 percent for all other types.

Conclusion

The disproportionate success in entry to medical school of students graduating from some types of colleges and universities most likely results from a combination of student abilities, academic program quality, family financial and social support, career expectations, and academic and career advising programs. In addition, because funding at most medical schools is tied to the number of state resident entrants, students desiring to go to medical school gravitate toward those undergraduate institutions that will be regarded well in their home states—locally, regionally, and nationally recognized schools. A recent analysis of students' undergraduate grades and Medical College Admission Test scores supported the idea that the greater success in admission of students from some types of institutions stems from the students' differing abilities and preparation (3). However, high scores among those accepted have not been found to be good predictors of medical school performance, professional behaviors, or career choices.

The information reported here on the undergraduate academic origins of applicants and entrants to medical schools may be useful to policymakers, premedical advisers, and medical schools. Those interested in the changing marketplace can use the information to determine additional future sources of students and to decide, in conjunction with other data, how a shift from one type of supplier to another might affect the physician population. Premedical advisers can compare their own institution's record with that of similar institutions to decide what further information about their institutions to communicate to medical schools. Each medical school sets its own admissions policies, based partly on its assessment of the quality of the preparation provided by each undergraduate school. The

TABLE 1

Relationship of Type of Public and Private Undergraduate Institution to Medical School Application and Matriculation*

	Percent Distribution of Population						Ratios (Percent)			
	Bachelor's Degrees 1979–1981 (n = 2,708,229)		Medical Applicants 1980–1982 (n = 102,535)		Medical Matriculants 1980–1982 (n = 47,997)		Matriculants to Applicants		Matriculants to Degrees	
Type of Undergraduate Institution†	Public Under-graduate	Private Under-graduate	Public Under-graduate	Private Under-graduate	Public Under-graduate	Private Under-graduate	Public Under-graduate	Private Under-graduate	Public Under-graduate	Private Under-graduate
Research I	13.7	3.2	17.8	11.6	17.8	15.4	47.0	61.8	2.3	8.4
Research II	9.7	1.7	10.8	4.8	10.7	5.6	46.5	54.0	2.0	5.9
Doctoral I	8.5	2.8	6.8	4.1	6.6	4.3	45.1	49.2	1.4	2.7
Doctoral II	3.5	1.0	2.2	1.3	2.1	1.2	44.0	45.9	1.1	2.2
Comprehensive I	26.8	8.0	12.5	8.2	10.2	7.4	38.2	42.4	0.6	1.6
Comprehensive II	4.2	4.0	1.5	3.4	1.0	4.1	31.2	42.5	0.4	1.3
Liberal Arts I	‡	3.5	‡	8.4	‡	9.3	‡	52.1	‡	4.7
Liberal Arts II	0.3	5.8	0.2	4.8	0.2	3.8	43.9	36.9	1.2	1.2
Specialized	2.0	1.3	1.0	0.4	0.9	0.3	40.6	32.1	0.8	0.4
Total	68.7	31.3	52.8	47.0	48.6	51.4	43.8	50.2	1.3	2.8

* Numbers for each cell of the table are available from the author.

† For definitions, see text.

‡ No institutions in this category.

information provided here can be used to examine their admissions practices against the national patterns to decide whether new evaluations of specific types of undergraduate institutions could help increase diversity among their students. An interchange fostered between undergraduate and medical schools could lead to a more dynamic evaluation of undergraduate preparation and possibly a greater breadth of types of prospective medical students.

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Concordance of Medical School Course Grades And NBME Parts I and II Examination Subject Test Scores

Janice P. Murphy, M.D., G. Craig Rosevear, and Nancy E. Gary, M.D.

Since course grades and subject test scores on examinations of the National Board of Medical Examiners (NBME) are both measures of knowledge acquired by medical students, a statistically significant relationship should exist between them. The purpose of the study reported here was to determine the degree of concordance between medical school grades and subject test scores of the NBME Part I and Part II examinations. Anatomy was not included in this study because gross and developmental anatomy, histology, and neuroanatomy are separate courses, the content of which is tested by one NBME subject examination.

In this report, NBME subject test score refers to the results of the twice annually administered NBME certifying examination (both parts I and II). The term miniboard test score refers to a subject examination obtained from and graded by the NBME for the purpose of testing students' knowledge in a single subject and usually administered at the end of a clinical clerkship or course. These latter examinations consist of questions from previously administered NBME tests. Consequently, courses using miniboard test results as a component of grading should show a stronger relationship between grade and NBME subject test score than courses that do not use miniboard tests. This relationship was also examined.

Methods and Results

The 469 students who were graduated from the University of Medicine and Dentistry of New Jersey-Rutgers Medical School in the classes of 1979–1983 formed the study group. Passage of the NBME tests parts I and II were not a requirement for promotion or graduation. An honors-pass-fail grading system is used. The exclusion of individuals who initially recorded an incomplete grade and student transfers into the school account for varying numbers of students in the groups analyzed. Since the investigators looked only at graduates, data on those who failed courses were not analyzed.

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ing the "halo effect," where the student's motivation and attentiveness may preclude identification of marginal knowledge; the student's ability to gather and present data not being a reflection of basic biomedical information; and faculty concern that a poor grade may be thought to reflect negatively on them. Additional reasons for this weak correlation may include the assignment of considerable weight to clinical skills, the relatively subjective assessment of knowledge by essay and oral tests, and the intrusion of personal bias into grading.

In conclusion, there is a positive correlation between NBME subject test scores and course grades. The degree of correlation suggests that faculty members are not "teaching to the boards." Basic science courses using a mini-board test score as part of the final grade did not have a stronger statistical relationship of grade to NBME subject test score than other courses. On the other hand, the clinical departments that minimized or excluded objective assessments of knowledge in determining course grade had the weakest correlation between grades and Part II NBME subject test scores.

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Faculty Development in Family Medicine: A Survey of Needs and Resources

S. R. Frisch, Ph.D., and Yves Talbot, M.D.

The expansion of family medicine training during the last decade brought many clinically competent physicians into academic medicine. Faculty development programs were also introduced to help physician-teachers improve their competence in essential academic skills. The purpose of the authors in this study was to assess the current status of faculty development programs in departments of family medicine.

Methods

All university-affiliated departments of family medicine in the United States and Canada (n = 180) were identified from lists provided by the American Academy of Family Physicians and the College of Family Physicians of Canada. A short questionnaire was mailed by the authors to the heads of those departments or directors of residency programs in family medicine in late 1981, and there was a postcard follow-up in early 1982.

Results

A total of 115 questionnaires (64 percent) were returned for analysis.

Respondents indicated perceived needs in faculty development by rating a list of clinical and academic areas on a 5-point scale, with high priority = 5, medium priority = 4, low priority = 3, sufficient skills already available = 2, and not relevant = 1. The areas of teaching/supervision and epidemiology/research received the highest average priority rating for faculty development. Geriatrics and family dynamics were third and fourth, respectively. Table 1 shows the areas rated and the distribution of responses.

In response to questions about available

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TABLE 1

Percentage of Family Medicine Department Heads and Directors of Family Medicine Residency Programs Responding to Question Concerning Perceived Needs in Family Medicine Faculty Development by Clinical and Academic Areas, 1982*

Area	Percent Giving Priority Rating†			Mean
	High	Medium	Low	
Teaching/supervision	55.3	29.8	14.9	4.32
Epidemiology/research	51.3	23.9	24.8	4.14
Geriatrics	31.3	43.8	25.0	3.93
Family dynamics	30.1	40.7	29.2	3.78
Administration	9.8	53.6	36.6	3.58
Obstetrics	17.9	27.7	54.5	3.21
Psychiatry	6.3	34.8	58.9	3.11
Pediatrics	14.2	19.5	66.3	3.03
Emergency medicine	5.3	30.1	64.7	2.97
Internal medicine	13.4	15.2	71.5	2.87
Surgery	2.7	13.4	84.0	2.73

* Sample size ranged from 112 to 114 respondents.

† Needs were rated on a 5-point scale, with high priority = 5, medium priority = 4, and low priority = 3. Sufficient skills already available = 2 and not relevant = 1 were also included in the low priority category in the table.

resources, most respondents reported local expertise was available to meet their faculty development needs. Twenty-seven respondents reported insufficient local expertise, however, particularly in teaching/supervision ($n = 16$) and epidemiology/research ($n = 11$). Respondents were asked to translate the faculty development methods available to faculty members in their department into dollars. Estimates of the amount available ranged from zero to $10,000 per faculty member, with a median figure of $1,000.

The most popular methods of faculty development were short-duration activities such as local workshops, invited speakers, or workshops at national meetings. The median estimate of the percentage of faculty members who had participated in short-duration activities was 90 to 100 percent per department. Faculty development was also accomplished by faculty members participating in various projects (for example, curriculum development) and consulting with experts in such fields as teaching/supervision and research and by the institutions granting faculty members unscheduled time for self-development and encouraging enrollment for additional degrees. "Seed" grant funds, journal clubs, participation in research projects, and writing articles reviewing published research on selected topics were cited by respondents as methods used to increase faculty members' research skills.

Respondents were asked to rate their likelihood of using various faculty development methods in the future. Support for travel to courses, conferences, and meetings was rated "very likely." Departmental workshops and invited speakers were rated "somewhat likely," while faculty exchange programs with other departments were rated "somewhat unlikely." Respondents were also asked to rate the options "grant four-months leave" and "grant one-year leave" to faculty members for participation in one semester or one-year intensive study or fellowship programs; both alternatives were rated "somewhat unlikely" to "not possible."

Discussion

Faculty development programs will be more effective when needs and resources are considered in deciding their content, format, and the follow-up activities which will promote continued change in faculty members' competencies (1). Family medicine department heads and directors of family medicine residency programs in the study reported here perceived a need for faculty development. The areas of teaching/supervision, epidemiology/research, family dynamics, and geriatrics were rated "high priority" by at least 30 percent of the sample. Local expertise was usually available to meet these needs, although it was most often reported lacking in the areas of high priority.

Departmental preferences for short-duration faculty development activities suggest time is a more important constraint than money. This lack of time is a major challenge to effective faculty development programs. Faculty members need time to reorient their thinking and to master the complex skills in the areas of research, teaching/supervision, and family dynamics. Appropriately "packaging" the faculty development activities can reduce the constraint of time. For example, total hours may be spread over a longer period, and intensive workshops may be combined with subsequent short training sessions.

Faculty members must also be motivated to give their own time for faculty development activities. Motivation is affected by how the activity is promoted; for example, learning a new approach is more attractive than remedial work to correct deficient performance. Motivation is also influenced by the results of participation. Letters of support for promotion and tenure and occasional comments on improved performance are important but insufficient. Also, the setting must be receptive to the changed skills of the faculty members. Discussions between faculty members and their directors or heads can be used to ensure that the individual's development efforts can contribute to the unit or department.

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Cost of Residents' Decisions On Actual Patients and in Simulated Encounters

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Physicians vary substantially in the quantity of ancillary services they order for their patients, resulting in very different costs of care for the patients (1–5). Identifying, explaining, and changing the ordering habits of physicians who order many ancillary services are becoming important cost containment goals. Educators and researchers have used written patient management problems (PMPs) to simulate real life clinical situations. PMPs measure physicians' data-gathering and management decisions and may also be used to calculate the cost of those decisions. It is assumed that physicians vary on their written PMP ordering costs just as they do with real patients, but the scarcity of comparative practice data has made it difficult to validate this assumption. If the assumption is correct, PMPs could be useful

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